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SEPTEMBER, 1949

RAILWAY MECHANICAL ENGINEER

With which is incorporated the Railway Electrical Engineer. Founded in 1832 as the American Rail-Road Journal.

VOLUME 123 **No. 9**

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C. W. Merriken, Jr.
Business Manager, New York

Published monthly by Simmons-Boardman Publishing Corporation
1309 Noble street, Philadelphia, Pa. Editorial and executive offices: 30 Church street, New York 7, and 79 W Monroe street, Chicago 3. Branch offices: Terminal Tower, Cleveland 13; 1081 National Press bldg., Washington 4, D.C.; 1914 Minors avenue, Seattle 1, Wash.; 816 W. Fifth avenue, Los Angeles 13, Calif.; 2909 Maple avenue, Dallas 4, Tex.

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The Railway Mechanical Engineer is a member of the Associated Business Papers (A.B.P.) and the Audit Bureau of Circulations (A.B.C.) and is indexed by the Industrial Arts Index and also by the Engineering Index Service. Printed in U. S. A.

Subscriptions payable in advance and postage free, United States, U. S. Possessions and Canada, 1 year, $3; 2 years, $5. Other countries in Western Hemisphere: 1 year, $5; 2 years, $8. All other countries; 1 year, $7; 2 years, $12. Single copies 50 cents. Address H. E. McCandless, circulation manager, 30 Church street, New York 7.

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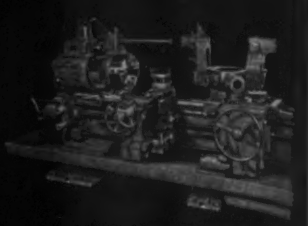

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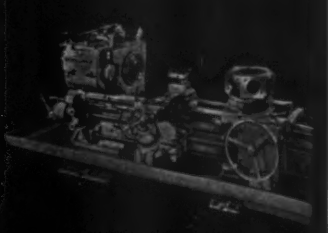

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Lima-Hamilton Switcher

Unit is powered by 1,200 hp. eight-cylinder supercharged Diesel engine with Westinghouse electrical equipment

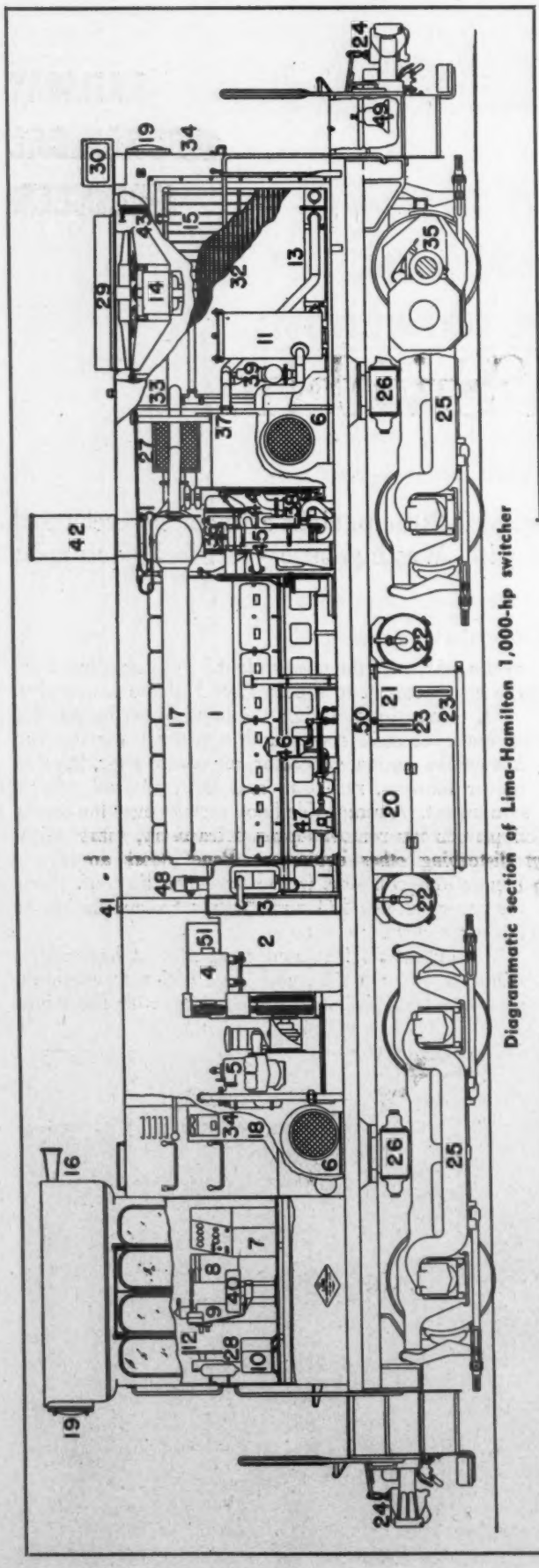
THE Lima-Hamilton Corporation, Lima Locomotive Works Division, Lima, Ohio, has made delivery of 1,000 hp. Diesel-electric switching locomotives to the Nickel Plate, the Erie and the New York Central.

Suitable for all kinds of hauling within its capacity, the switcher is powered by a Hamilton 9-in. by 12-in. eight-cylinder, supercharged, four-cycle vertical Diesel engine, which provides a full 1,000 b.hp. for traction, utilizing the full capacity of the traction motors. The switcher, which weighs 120 tons in working order, has a maximum speed of 60 m.p.h.

The locomotives are of the B-B wheel arrangement, and have a single cab mounted on the frame which is carried on two four-wheel swivel trucks with a motor on each axle. The operator's compartment is located at the rear, with the power plant hood extending from the compartment to the front end of the locomotive.

Of conventional design, the hood of the locomotive is made of steel sheets and structural shapes, and houses the engine, generator, air compressor, traction motor blowers, radiators and fans, and all control equipment. A removable hood section over the power plant permits removal for repairs if necessary, without disturbing other equipment. Panel doors are located on each side, with hatches in the roof. Ducts for the generator fan outlet prevent recirculation of hot air under the engine hood.

The operator's insulated compartment has sliding windows on each side, and front and rear windows, also on each side, of the fixed type, with the wind-



Diagrammatic section of Lima-Hamilton 1,000-hp switcher

1—Engine
2—Main generator
3—Main generator blower
4—Fan generator
5—Air compressor
6—Traction-motor blower
7—Instrument panel
8—Controller
9—Air-brake valve
10—Cab heaters
11—Lube-oil filter
12—Hand brake
13—Heat exchanger
14—Cooling-fan and motor
15—Radiator shutters
16—Horn
17—Exhaust manifold
18—Sand box
19—Headlight
20—Battery box (both sides)
21—Fuel tank
22—Main air reservoir
23—Fuel-tank gauge
24—Coupler and draft gear
25—Trucks
26—Brake cylinder
27—Engine air-intake filter
28—Fire extinguisher
29—Balanced shutters
30—Number light (front)
31—Turbocharger
32—Radiator
33—Water tank
34—Sand-box filler
35—Traction motor
36—Intercooler
37—Lube-oil tank
38—Lube-oil pumps
39—Lube-oil relief valve
40—Engineman's seat
41—Generator exhaust stack
42—Engine exhaust stack
43—Water sight gauge
44—Lube-oil sight gauge
45—Lube-oil strainer
46—Fuel-oil filter
47—Fuel transfer pump motor
48—Engine governor
49—Bell
50—Emergency fuel shutoff valve
51—Auxiliary generator exciter

shield wipers on the exterior. Two electric heaters with circulating fans provide low, medium, and high heat.

Trucks for the locomotive are the side-equalized swivel type with rigid bolsters and outside friction bearings. Truck frames are one-piece steel castings, made by General Steel Castings Corporation. The pedestals are protected from wear by hardened steel liners, with pedestal caps made of forged steel, bolted in place. Steel liners on the sides and a loose liner on the bottom protect truck center plates from wear and also permit height adjustment. Side bearings are fitted with hardened steel wear plates. The truck frame transfers the load to the equalizer through double coil and semi-elliptic springs. Cast steel journal boxes are fitted with bronze friction bearings and a bronze thrust bearing.

The 1,200-hp. Diesel engine operates at a brake mean effective pressure of 165 lb. per sq. in. with a firing pressure of 1,200 to 1,400 lb. This is far beyond the pressure used in any other engine of this general type, according to the manufacturer, but the engine, with its heavy construction, is said to have been designed for pressures well in excess of those currently being used.

This engine's high b.m.e.p.—which means that 1,000 hp. for traction can be developed with eight 9-in. by 12-in. cylinders—has been made possible by an inter-cooler located between the blower discharge and the intake manifold, which lowers the air temperature some 60 deg. F. before it enters the intake manifold. As a result, the temperature at the exhaust manifold is lowered by about 180 deg.

This high pressure permits this engine to have small cylinders for the horsepower developed. Maintenance is simplified by the ability of one man to pick up a piston and connecting rod without a crane on mechanical support, and one man and a helper can remove the cylinder head without a crane. Other parts that have to be worked on are correspondingly

reduced in size and weight. The number of moving parts has been held to a minimum.

The crankcase is ventilated by the generator cooling fan, which pulls a two- to 3-in. vacuum on the crankcase, thus minimizing the possibility of explosions. This is accomplished by connecting the fan housing and the crankcase interior with piping.

Tri-metal main bearing inserts are used. These comprise a 3/8-in. steel backing, a 1/32-in. copper-lead intermediate piece, and a .002-in. thick tin bearing surface.

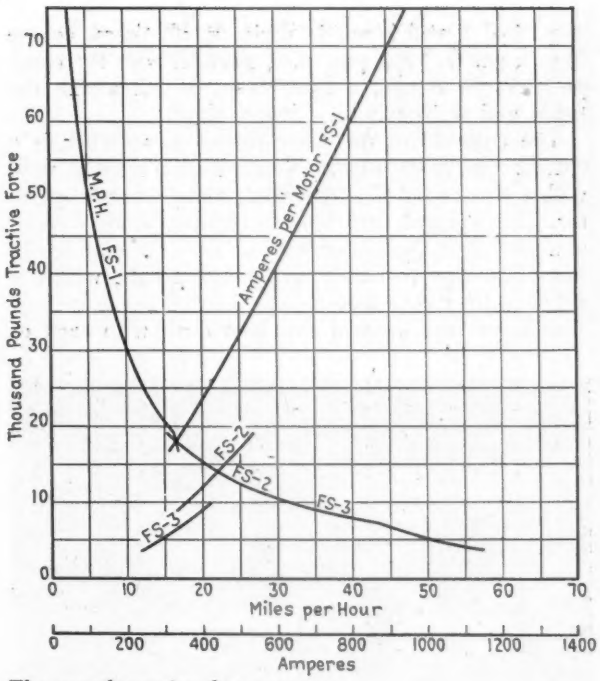
The exhaust manifold is water-cooled along with the cylinder heads and the supercharger to permit equal expansion of these parts, and, in this manner, to help keep the head joints tight.

Other characteristics of Lima-Hamilton design are the interchangeable intake and exhaust valve; the hose connection between cylinder liner and head; the seals between the cylinder liner and block, which eliminate any chance of water entering the crankcase; and the ease of inspecting or replacing main bearings.

Westinghouse electrical equipment is used throughout, with four Westinghouse 362-D traction motors driving the locomotive. Cooling air is supplied to each truck by separate blowers. All electrical equipment is interchangeable with other standard Westinghouse equipment, except for the main generator and the fan generator.

The main generator is Westinghouse Type 499-A, single bearing, self-ventilated, with Class B insulation. It is separately excited from an exciter-generator unit mounted on the main generator, driven by V-belts from the generator shaft extension. The exciter and an auxiliary generator are mounted on the same shaft. The auxiliary generator, regulated for 64 volts, provides power for control, lighting, battery charging, the two cab heaters, and excitation for the exciter of the main generator and for the fan generator. The latter is mounted on the main generator and is also driven by V-belts from the main generator shaft extension. Separately excited, and not regulated, this generator supplies power to the radiator fan motor and two traction-motor blowers.

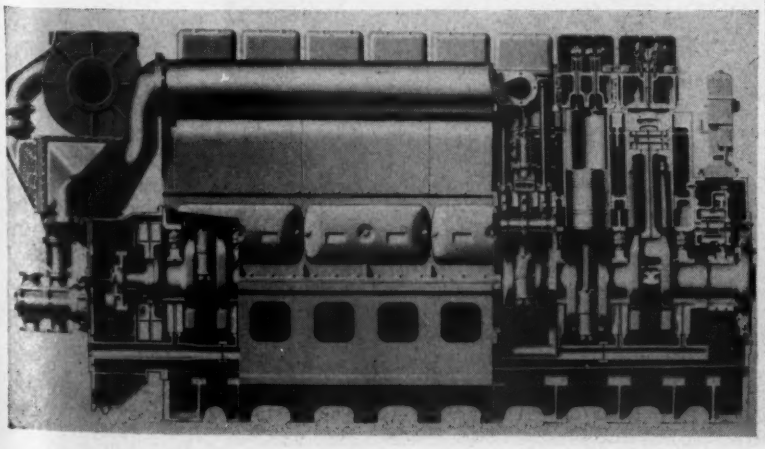
The two traction-motor blower motors are of the series types with Class B insulation. The air from the blower passes through each center plate, then through the hollow truck bolster from which it is distributed to each traction motor. The blowers are motor driven, direct connected. Similarly, the radiator fan is motor driven, rather than mechanically driven from the engine. It can be shut down when the radiator shutters are closed, which aids in keeping the engine warm when idling on a cold day.

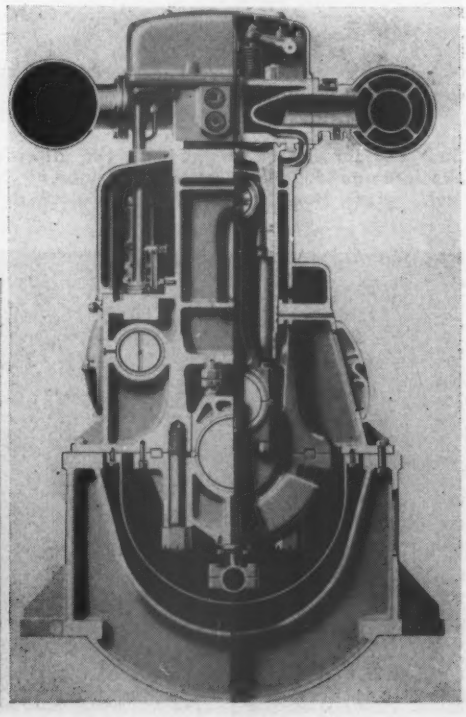


The speed-tractive force curve

The four Westinghouse Type 362-D traction motors are series type, axle hung, forced ventilated, and equipped with single reduction gearing having a ratio of 14.68. They have Class B insulation. Traction mo-

Sectional views of Hamilton Diesel engine





tors Nos. 1 and 3 are in series at all times, as are Nos. 2 and 4. Each pair is in parallel with the other pair. At 16 m.p.h., a light shunt is put across the fields and at 32-m.p.h., a heavy shunt.

The control for the Lima-Hamilton switcher is a remote, electro-pneumatic, single station control, used with a Woodward P. G. governor and governor operator. This control functions to regulate engine speed and the main generator exciter field. It employs a face-plate type resistor, having 162 points, which is actuated by a vane motor controlled by the governor. This gives load control and load limit with each of the eight notches of the controller. The governor is set to give low horsepower in the low notches to facilitate switching passenger equipment, and to give a rapid increase in horsepower in the high notches for heavy freight switching. To start a heavy freight load, for example, the controller can be pulled around to the eighth notch, with the engine coming up to full speed and full power in 20 seconds.

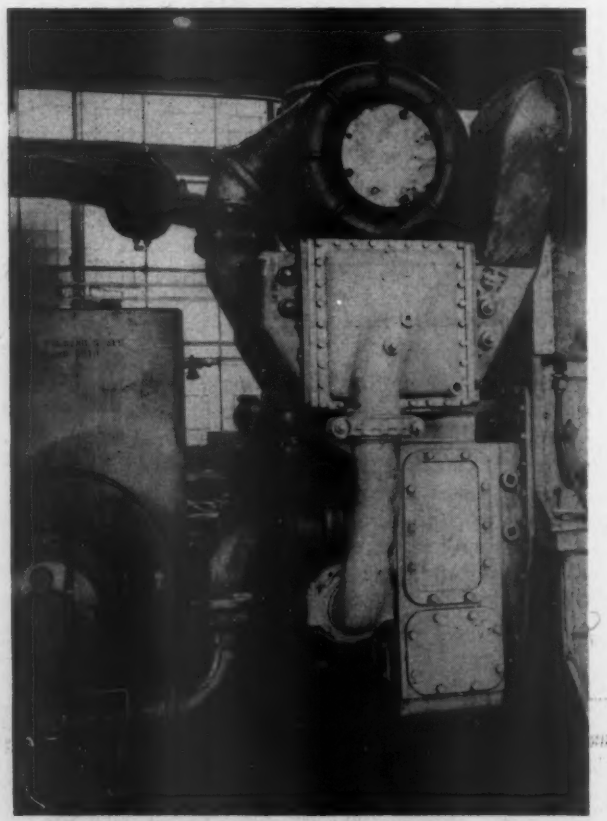
The locomotive can be equipped with multiple-unit control, and the units to be built for the Erie are to be so equipped.

Lighting and other auxiliary apparatus is push-button controlled, while the two steps of field shunting, mentioned above, are automatically switched. The compressed air pressure for electro-pneumatic apparatus is 70 lb. per sq. in. Wheel slip relays operate a light to warn the engineman when slipping occurs.

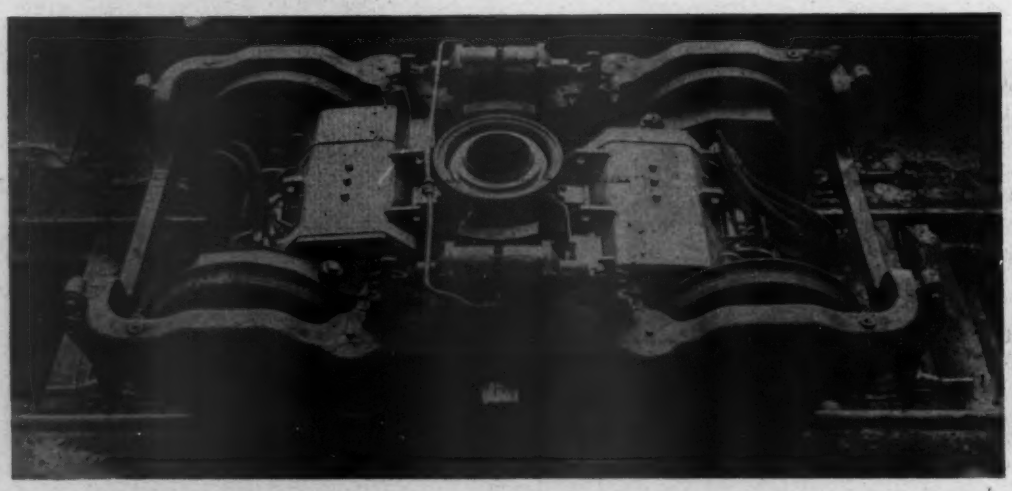
Heavy-duty storage batteries furnish power for engine starting and for stand-by lighting. They are located in ventilated compartments, and for inspec-

GENERAL CHARACTERISTICS OF LIMA-HAMILTON 1,000-HP. DIESEL-ELECTRIC SWITCHING LOCOMOTIVE

Locomotive Class	B-B (0-4-4-0)
Diesel engine:	
One, eight-cylinder, in-line, vertical, super-charged, b.hp. available for traction	1,000
Driving motors:	
Number	Four
Type	362-D
Journal bearings (friction) size, in.	6½ by 12
Wheel, diameter, in.	40
Wheel base, ft.-in.:	
Truck	8—0
Total locomotive	32—6
Total weight, lb.:	
In working order	240,000
On drivers	240,000
Maximum overall dimensions, ft.-in.:	
Width	9—10
Height	14—6
Height to top of cab	14—6
Length (inside coupler knuckles)	47—10
Minimum radius curvature, ft.:	
Locomotive alone	75
With train	100
Supplies (total capacity):	
Lubricating oil, gal.	170
Fuel oil, gal.	600
Engine cooling water, gal.	190
Sand, cu. ft. (total)	28
Performance:	
Gear ratio	14:68
Starting tractive force (at 25 per cent adhesion), lb.	60,000
Tractive force, continuous, lb.	34,000
Speed at continuous rating, m.p.h.	8.9
Maximum speed, m.p.h	60



Supercharger end of engine with the intercooler in the foreground. Motor blower and lube oil tank at left. Note flexible pipe couplings used at joints



Four-wheel truck showing traction motors and center plate design

PARTIAL LIST OF MATERIALS AND EQUIPMENT ON THE LIMA-HAMILTON 1,000-HP. DIESEL-ELECTRIC SWITCHER

Diesel engine	Lima-Hamilton Corporation, Hamilton, Ohio
Turbocharger	Elliott Co., Jeannette, Pa.
Bell ringer	Viloco Railway Equipment Co., Chicago
Windshield wipers	Charles A. Sprague Devices Co., Michigan City, Ind.
Inspection card holders	Adams & Westlake Co., Elkhart, Ind.
Windshield wings	Prime Manufacturing Co., Milwaukee, Wis.
Cab door-front and rear	Met-L-Wood Corporation, Chicago
Cab-door locks	Adams and Westlake Co., Elkhart, Ind
Footboard	Apex Railway Products Co., Chicago
Side step treads	Blaw-Knox Company, Pittsburgh, Pa.
Headlight; number light box	Pyle-National Company, Chicago
Grid-type vent with weather cap	Protectoseal Company, Chicago
Air whistle	Leslie Company, Lyndhurst, N. J.
Fire extinguishers	Walter Kidde & Co., Belleville, N. J. Pyrene Manufacturing Co., Newark, N. J.
Sanders	Prime Manufacturing Company, Milwaukee, Wis.
Air compressor	Gardner-Denver Co., Quincy, Ill.
Air brake; foundation brake gear	Westinghouse Air Brake Co., Wilmerding, Pa.
Handbrake	National Brake Co., New York
Journal boxes, plain	Balmar Corp., Baltimore, Md.
Couplers and yokes	Buckeye Steel Castings Co., Columbus, Ohio
Friction draft gear	W. H. Miner, Inc., Chicago
Governor	Woodward Governor Co., Rockford, Ill.
Couplings	Falk Corporation, Milwaukee, Wis.
Trucks	General Steel Castings Corp., Granite City, Ill.
Wheels	Armco Steel Corporation, Middletown, Ohio Bethlehem Steel Co., Bethlehem, Pa.
Batteries	Electric Storage Battery Co., Philadelphia, Pa.
Electrical equipment	Westinghouse Electric Corp., Pittsburgh, Pa.
Motor cable clasp connectors	Burndy Engineering Company, New York
Emergency fuel shut-off valve	Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Fuel oil pump	Viking Pump Company, Cedar Falls, Iowa
Back pressure valve	Klipfel Manufacturing Co., Hamilton, Ohio
Lubricating-oil pressure strainer	W. W. Nugent Company, Chicago
Lubricating oil filter	Michiana Products Corp., Michigan City, Ind.
Fuel oil filter	W. W. Nugent Company, Chicago
Fuel oil tank level gages	Nathan Manufacturing Co., New York
Water tank and lubricant gage	O. C. Keckley Company, Chicago
Special gages	Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Water temperature-operated switch and control sleeve	Detroit Lubricator Company, Detroit, Mich.
Cab ventilators	Prime Manufacturing Co., Milwaukee, Wis.
Cab air heaters	Edwin L. Wiegand Company, Pittsburgh, Pa.
Air filter and silencer	Air Maze Corporation, Cleveland, Ohio
Radiator cooling fan	International Engineering, Inc., Dayton, Ohio
Radiator shutter assembly	Kysor Heater Company, Cadillac, Mich.
Radiators and heat exchanger	Young Radiator Company, Racine, Wis.
Flexible pipe couplings	Victaulic Co. of America, New York

tion and maintenance are accessible from the outside without inconvenience.

The air brake equipment is the Westinghouse No. 6-DS single-end automatic and self-lapping straight air brake, with main reservoir capacity of 60,000 cu. in. A Gardner-Denver air compressor is connected to the end of the main generator shaft by a flexible coupling. The truck brakes are the clasp type, with two brake cylinders mounted on each truck. A hand brake is connected to the brake rigging of one truck to hold the locomotive when idle. All brake piping and equipment are under the cab, readily accessible.

The underframe of the locomotive is of welded construction with a pocket in each end for the automatic coupler and draft gear. An A.A.R. Type E automatic swivel coupler with a standard type friction draft gear is applied to each end of the locomotive. The uncoupling rigging is of forged steel bar construction and arranged for operation from either side.

Victaulic couplings are used on the piping. A flexible coupling with a rubber insert, it eliminates threading the ends of the pipe to be coupled, and is said to provide tight joints even where slight misalignment may exist. The victaulic coupling is adapted to joints between the chassis and the engine where there is vibration and permits interchangeability in piping. Pipe for the air lines is of extra-heavy wrought iron, except for gages and miscellaneous piping, which is of copper. Fittings are extra heavy standard.

The fuel oil tank is under the locomotive frame and is arranged so that it may be filled from either side. The fuel oil level gages, fuel oil emergency shut-off valve and means for draining the tank are installed on both sides.

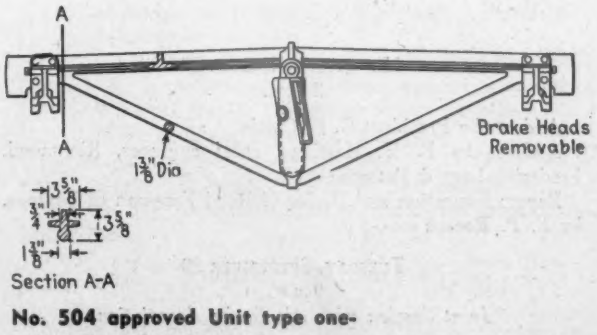
A 75-volt lighting system furnishes illumination for the cab, engine, cooling compartments, and number lights. There is a 32-volt, 250-watt Pyle-National electric headlight located at each end of the locomotive.

Four sandboxes, with a combined capacity of 28 cu. ft., are arranged for filling from the running board. Air-operated sanders are arranged to sand the front wheels of each truck in both directions. The control valve is in the operator's compartment.

One 20-lb. Kidde fire extinguisher is located under the hood, and one in the cab. There is also a 1½-qt. Pyrene extinguisher mounted in the cab.

Proposed No. 18 Brake Beams—A Correction

In a summary of the report of the Car Construction Committee of the Mechanical Division of the A. A. R. which appeared in the August *Railway Mechanical Engineer*, pages 444 to 449, illustrations were included which were intended to show the five brake beams which have been recommended for certificates of approval under the proposed Specifications for the new No. 18 brake beam. These are Nos. 102, 501, 503, 504, and 106. The illustrations of Nos. 101, 501, and 503 were correct. That which was included to show No. 106, the hanger-type version of the unit type No. 504, actually showed No. 105 which has not been recommended for a certificate of approval. The accompanying illustration is that of No. 504, approved as the result of tests. No. 106, being a duplicate of No. 504 except that it is a hanger type, was approved without test.



No. 504 approved Unit type one-piece forged-truss brake beam

Coordinated Mechanical Programs

THE 1949 annual meetings of the Coordinated Mechanical Associations—Air Brake, Car Department Officers, Fuel and Traveling Engineers, Locomotive Maintenance Officers and Master Boiler Makers—will be held at the Hotel Sherman, Chicago, for four days, beginning Monday, September 19, through September 22. The meetings of the A. A. R. Electrical Section, Mechanical Division, will be held at Hotel La Salle, Chicago, September 19 to 21 inclusive and the sessions of the A. A. R. Electrical Section, Engineering Division, will be held at the La Salle on September 22. The programs of the five mechanical associations appear on the following two pages while the Electrical Section programs appear on page 515. Coincident with the meetings there will be an exhibit of mechanical products by the Allied Railway Supply Association, Inc.

The officers elected by the coordinating committee of the Coordinated Mechanical Associations, which is made up of the presidents and secretaries of the five railway associations and the exhibiting organization to serve through this year were: Chairman, J. E. Goodwin, vice president and executive assistant to the president, Chicago & North Western; vice chairman, J. M. Nicholson, director, department of research, Atchison, Topeka & Santa Fe, and secretary, C. F. Weil, American Brake Shoe Company, secretary-treasurer of the Allied Railway Supply Association. However, due to the resignation of Mr. Goodwin who, because of his promotion to an executive position is no longer a member of the A. A. R. Mechanical Division, the chairmanship of the coordinated committee is vacant at present. E. H. Weaver, Westinghouse Air Brake Company, is president of the Allied Railway Supply Association.

Meetings of the five mechanical associations will be held at Hotel Sherman, Chicago, September 19-22

Joint Session

MONDAY, SEPTEMBER 19
10:30 a.m.
Address. Speaker and subject to be announced later.

TUESDAY, SEPTEMBER 20
Afternoon
Visit to exhibits

Railway Fuel and Traveling Engineers' Association

MONDAY, SEPTEMBER 19
2 p.m.

Address by President G. B. Curtis

Address by E. M. Hastings, chief engineer, Richmond, Fredericksburg & Potomac

Paper: Education and Duties of Road Foreman of Engines, by F. P. Roesch

TUESDAY, SEPTEMBER 20
9 a.m.
Joint Session with Air Brake Association

Address by L. K. Sillcox, first vice-president, New York Air Brake Company

Report on Passenger Brake Handling and Cause of Rough Stops, by F. R. Browning, supervisor of locomotive operation, Baltimore & Ohio

Report on Freight-Train Handling, by W. B. Weightman, general air-brake inspector, Pennsylvania

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Report on Front Ends, Grates, Ashpans and Arches, by S. R. Tilbury, fuel supervisor, Atchison, Topeka & Santa Fe

Secretary-Treasurer's report

WEDNESDAY, SEPTEMBER 21

9 a.m.

Report on Education of Engine Crews—Steam, by G. E. Anderson, general fuel supervisor, Great Northern

Report on Smoke Prevention on the Road and in Terminals, M. G. Stewart, Washington Terminals

Report on Operation of Steam Generators on Diesels, by R. D. Nicholson, road foreman of engines, N. Y., N. H. & H.

2 p.m.

Report on Education of Engine Crews—Diesel, by F. Thomas, assistant to general superintendent equipment—Diesel and electric, New York Central

Address: Petroleum and Its Relation to Past and Future E. M. D. Locomotive Operation, by W. K. Simpson, fuel and lubricant engineer, Electro-Motive Division, General Motors Corporation

THURSDAY, SEPTEMBER 22

9 a.m.

Report on Unit Cost of Coal on Locomotives, by A. A. Raymond, superintendent fuel and locomotive performance, New York Central

Address: Coal Sizing and Preparation, by C. W. Waterman, Jr., district manager, McNally Pittsburgh Manufacturing Corporation

Address: The Coal Operator and the Railroads, by J. E. Tobey, Appalachian Coals

Report on Economical Operation and Handling of Stokers, by D. C. Black, road foreman of equipment, St. Louis-San Francisco

Report on Oil-Burning Locomotives and What Economies Are To Be Obtained, by T. L. Henley, chief fuel supervisor, Missouri-Kansas-Texas

Master Boiler Makers' Association

MONDAY, SEPTEMBER 19

2 p.m.

Address by President Edward H. Heidel

Address by H. J. Burkley, superintendent of motive power, Baltimore & Ohio

Report—Topic No. 2: Recommended Practices for Staybolt Application and Maintenance, by Dr. G. R. Greenslade, director of research, Flannery Bolt Company

TUESDAY, SEPTEMBER 20

9 a.m.

Message by Secretary-Treasurer Albert F. Stiglmeier

Address by E. P. Gangewere, assistant general manager, Reading

Report—Topic No. 1: How Can the Master Boiler Maker Aid in Smoke Abatement and Fire Prevention, by E. H. Gilley, general boiler foreman, Grand Trunk Western

Report on Advantages of Steam Space Spray Boiler Checks or Top Boiler Checks vs. Side Boiler Checks, by K. D. Relyea, test department, New York Central System

WEDNESDAY, SEPTEMBER 21

9 a.m.

Report of the Executive Board

Report of the Secretary-Treasurer

Message by Edward H. Davidson, director, Bureau of Locomotive Inspection, I.C.C.

Report—Topic 3: Problems and Uses of Modern Boiler and Firebox Steel, Ray McBrian (chairman), engineer standards and research, Denver & Rio Grande Western

Report of Committee on Law

2 p.m.

Report of Committee on Memorials

Address by F. S. Hartle, assistant director of operations, Board of Transport Commissioners for Canada

Report—Topic 4: The Education and Training of Boiler Supervision, T. J. Lyon (chairman), superintendent of equipment, New York Central

Election of officers

THURSDAY, SEPTEMBER 22

9 a.m.

Report of Committee on Resolutions

Message by D. E. Mumford, superintendent of safety, New York Central System

Report—Topic 5: Washing Boilers. Comparison of Hot Blow-Down vs. Cool-Down Method. H. R. Barclay (chairman), general boiler inspector, Northern Pacific

Locomotive Maintenance Officers' Association

MONDAY, SEPTEMBER 19

2 p.m.

Address by President J. W. Hawthorne

Report of Committee on Terminal Facilities—Steam, C. E. Pond, (chairman), assistant to superintendent motive power, Norfolk & Western. Topic: Improving the Utilization of Steam Locomotives

Report of Committee on Terminal Facilities—Diesel, H. E. Niksch (chairman), master mechanic, Elgin, Joliet & Eastern. Topic: Modern Diesel Servicing Stations

TUESDAY, SEPTEMBER 20

9 a.m.

Address by A. K. Galloway, general superintendent motive power and equipment, Baltimore & Ohio. Topic: Steam Locomotive Maintenance

Report of Committee on Steam Locomotive Shop Practices—General, F. B. Rykoskey (chairman), supervisor of shops, Baltimore & Ohio. Topic: Expediting System for Material and Tool Delivery in Roundhouse and Back Shop

Report of Committee on Shop Tools, C. R. Eisele (chairman), master mechanic, Denver & Rio Grande Western. Topic: Tooling for Reclamation of Steam and Diesel Locomotive Parts

WEDNESDAY, SEPTEMBER 21

9 a.m.

Report of Committee on Personnel Training—Steam, Jack Wolff (chairman), special representative, Chesapeake & Ohio.

Topic: Improving Attitudes and Skills Through Improved Supervision

Report of Committee on Personnel Training—Diesel, Glenn E. Rodgers (chairman), supervisor of Diesel instruction car, Atchison, Topeka & Santa Fe. Topic: Introducing Steam Personnel to the Diesel Locomotive

2 p.m.

Report of the Committee on Diesel Electrical (in joint session with Electrical Section, Mechanical Division, A.A.R.)—R. I. Fort (chairman), assistant research engineer, Illinois Central. Topics:

Report on Automotive Equipment, Electrical Section

Dynamic braking, by J. P. Morris, assistant to vice-president (mechanical), Atchison, Topeka & Santa Fe

Load Testing of Diesel Engines

Traction Motor Maintenance

Traction Motor and Main Generator Overhaul

THURSDAY, SEPTEMBER 22

9 a.m.

Report of the Committee on Diesel Mechanical—W. L. Huebner (chairman), supervisor of Diesel engines, Atchison, Topeka & Santa Fe. Topics:

Heavy Engine Overhaul

Winterization Program for Diesel Locomotives

Car Department Officers' Association

MONDAY, SEPTEMBER 19

2 p.m.

Address by President P. J. Hogan

Report of Committee on Modern General Repair Shop Operation and Methods, H. A. Grothe (chairman), shop superintendent, Chicago, Milwaukee, St. Paul & Pacific

TUESDAY, SEPTEMBER 20

9 a.m.

Address by J. F. Doolan, vice-president—operations, New York, New Haven & Hartford

Report of Committee on Loading Rules, J. Krupka (chairman), general car foreman, Chicago, Burlington & Quincy

Report of Committee on Interchange and Billing for Car Repairs, R. W. Hollon (chairman), mechanical inspector, Chicago, Burlington & Quincy

WEDNESDAY, SEPTEMBER 21

9 a.m.

Address by J. J. Brinkworth, vice-president (operating), New York Central

Report of Committee on Analysis of Train-Yard Operations to Improve Performance, G. J. Flanagan (chairman), general car inspector, New York Central System

2 p.m.

Report of Committee on Responsibilities of Car Department Supervision, R. E. Baker (chairman), assistant general manager (mechanical), Boston & Maine

Report of Committee on Air-Conditioning Equipment—Operations and Maintenance, C. S. Albright (chairman), supervisor electrical equipment, New York Central

THURSDAY, SEPTEMBER 22

9 a.m.

Report of Committee on Modern Methods of Freight-Car Painting, R. Middleton (chairman), painter foreman, New York, Chicago & St. Louis

Miscellaneous reports

Election of officers

Air Brake Association

MONDAY, SEPTEMBER 19

2 p.m.

Report of Committee on Approved Maintenance Practice, C. E. Miller (chairman), superintendent air brakes and steam heating, New York Central System. Subjects:

Shop Maintenance of Brake Valves

Shop Maintenance of Control and Feed Valves

Roundhouse Maintenance and Inspection of Feed Valves

TUESDAY, SEPTEMBER 20

9 a.m.

Joint session with Railway Fuel and Traveling Engineers' Association

Address by L. K. Sillcox, first vice-president, New York Air Brake Company

Report on Passenger Brake Handling and Cause of Rough Stops, by F. R. Browning, supervisor of locomotive operation, Baltimore & Ohio

Report on Freight-Train Handling, by W. B. Weightman, general air-brake inspector, Pennsylvania

WEDNESDAY, SEPTEMBER 21

9 a.m.

Dynamic and Regenerative Braking—Freight and Passenger Trains, by D. R. Collins, superintendent air brakes, Denver & Rio Grande Western

Wheel Slip and What Can Be Done About It—C. L. Eksergian, executive engineer, Budd Company

American Brake Shoe Anti-Wheel Slide Controller, by R. L. Wilson, assistant chief engineer, American Brake Shoe Company

Evolution of the A. P. Decelostat System, by H. I. Tramblie, air-brake engineer, Chicago, Burlington & Quincy

Control and Indication of High-Speed Passenger Brake Equipment, by C. M. Hines, electrical engineer, Westinghouse Air Brake Company

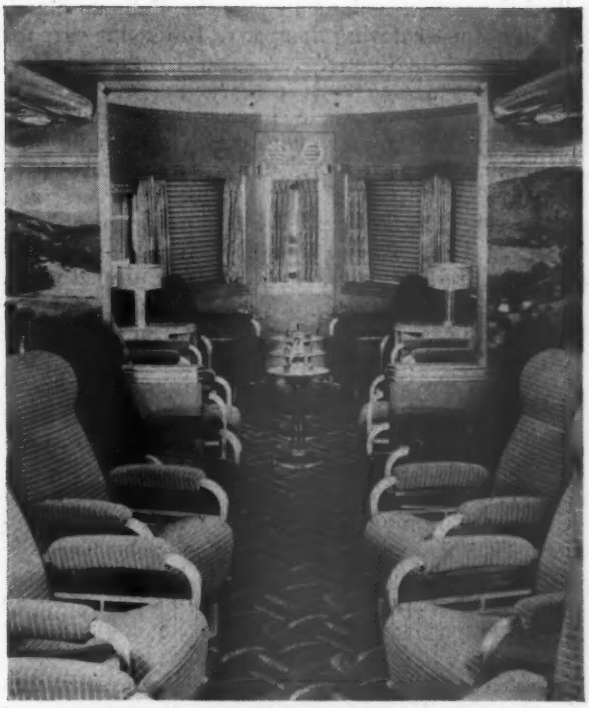
3 p.m.

Elimination of Moisture in Diesel Locomotives, Manhattan Air Brake Club

THURSDAY, SEPTEMBER 22

Brake Flow Indicator, by H. N. Sudduth, director of air-brake engineering, New York Air Brake Company

Two New "Shasta Daylights" On the S. P.



All but two of 30 cars built by Pullman Standard to conform to character of other "Daylights." Two cars modernized by railroad

The bar is in the center of the tavern car — The Shasta observation-lounge is shown at the top of the page

Two "Shasta Daylight" streamline passenger trains were placed in service by the Southern Pacific on July 10 between San Francisco, Calif., and Portland, Ore. These trains, each consisting of 15 cars behind a 6,000-hp. Diesel-electric locomotive, are similar in interior refinements for the comfort and pleasure of passengers to other previously installed Southern Pacific "Daylight" trains. These trains make a 714-mile rail trip at an average speed of 47.5 m.p.h. with 11 intermediate stops. The trip requires 15½ hours, including the four-mile ferry trip across San Francisco Bay.

The locomotive for one train was furnished by the Electro-Motive Division and that for the other by Alco-G. E.

The consist of each train is identical and includes the following: one combination baggage-postal car; one chair car having news agent's space, seating 46; three full chair cars, each seating 48; one chair car having dining crew's dressing room and toilet, seating 38; one three-car articulated unit consisting of a coffee shop, seating 66, and a diner, seating 66, separated by a kitchen car which serves both; three chair cars, each seating 48; a tavern car, seating 54; another chair car, seating 48, and a parlor-observation car remodeled by the railroad from an existing car and seating 32.

With the exception of the parlor-observation cars,

all of the cars were built new by the Pullman-Standard Car Manufacturing Company. Unlike the cars for the earlier "Daylights," furnished by this builder, which were welded truss construction of low-alloy high-strength steel, these have superstructures of aluminum-alloy girder construction. Among the Aluminum Company alloys employed are Alclad 61S-T62 for side posts and carlines; 14S-T for end and door posts; 24S-T3 for side sheets, pier panels, letter boards and roof sheets, and 14S-T for side-plate sections, sash rests, purlines, and other nonformed parts.

The underframes, including center sills, are made of steel and welded throughout, except for application of the cast-steel center plates. The use of strong aluminum alloys in the superstructures only, above the underframes, is estimated to effect an average saving of 5,300 lb. per car or about 40 tons for a 15-car train.

Electric power for the passenger-carrying cars and the air-conditioning is supplied by Waukesha equipment. The baggage-postal car has a Safety axle-driven body-hung generator. Heat for the kitchen range and hot water supply is furnished by propane gas. The passenger-carrying cars have fluorescent lighting.

The car trucks are six-wheel type for the baggage-postal car and at the articulations of the triple-car coffee shop-kitchen-dining unit; all other trucks are four-wheel type. The journal sizes for all trucks are 6 in. by 11 in. and Timken roller bearings are supplied throughout. Each car has a Fenwal journal-box heat indicator and alarm.

The air brakes are Westinghouse high-speed equipment including electro-pneumatic features for controlling the application and release of air from the brake cylinders. An anti-wheel-slide device is installed, Each car has two hand brakes.

All window sash units are double-glazed, having safety glass for the inside pane and ¼-in. polished plate for the outer pane. Window sash openings throughout the train are 30 per cent higher than usual and over 60 in. wide so as to give passengers maximum vision not only out but upward in scenic mountainous country. Dodge venetian blinds are used in the tavern car and in the coffee shop and diner of the triple-articulated unit. Other car windows have shades. All cars are fully air-conditioned except the baggage-postal car.

All cars but the baggage-postal and the kitchen

"SHASTA DAYLIGHT" CAR LENGTHS WEIGHTS AND SEATING CAPACITIES

	Length over couplers, ft	Estimated weight, lb.	Seating capacity
1 baggage-postal car	85	137,150*	..
1 chair car	85	125,090	46
1 chair car	85	123,800	48
1 chair car	85	123,800*	48
1 chair car	85	126,883	48
1 chair car	85	125,158	38
1 triple unit	..	314,234	..
1 coffee shop car	..	..	66
1 kitchen car	..	..	..
1 dining car	..	..	66
1 chair car	85	126,883	48
1 chair car	85	123,800	48
1 chair car	85	126,883	48
1 tavern car	85	123,400*	54
1 chair car	85	126,800	48
1 parlor-observation		153,550	32

*Scale weights

One of the tavern cars and one of the four-wheel trucks installed under individual cars

cars have radio speakers. Each of the chair cars has a hand luggage elevator adjacent to the entrance at the vestibule end. This feature, as on the previous "Daylights," enables the porter to take suitcases and other passenger luggage into the car without using the car end-door, as the baggage is placed on shelves in the luggage compartment from the outside and then is raised in position to a compartment inside the car. The shelves are raised and lowered by motor-driven screws controlled from pushbutton stations.

Practically all the kitchen and pantry equipment is made of Monel metal. The refrigerators are equipped with Carbofrezer dry-ice units. Service buffets in the lobbies of the coffee shop and dining cars have Lowerator automatic dispensers for cups and saucers. A steward's cabinet desk is located in the center of each of these two cars.

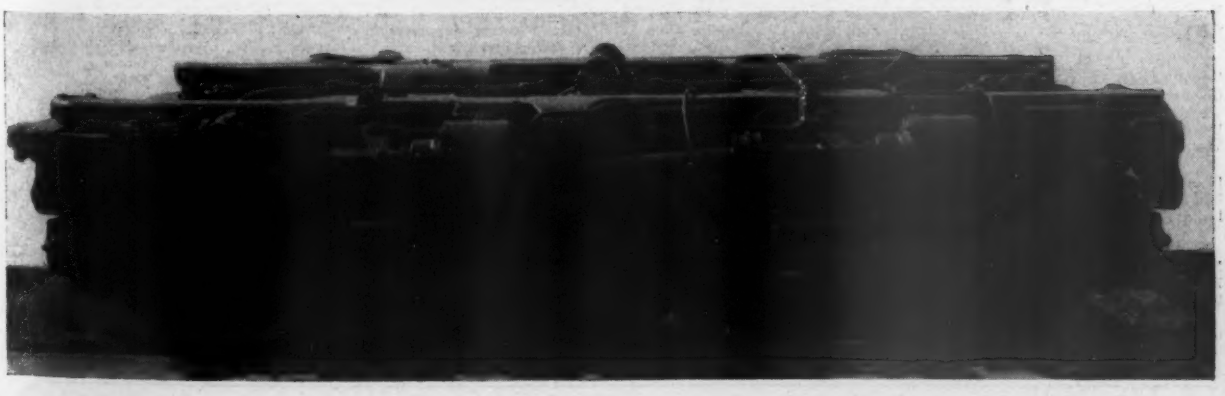
The "Shasta Daylight" streamliners are individually styled to an exceptional degree as a result of painstaking research into colors, local arts and crafts, folklore and landmarks of the territory served by the new trains. This work was done by the Pullman-Standard color and design department, in cooperation with the Southern Pacific.

The exterior colors and striping are the same as on existing "Daylights," namely orange, red and black. Car interiors are bright and cheerful with special attention to appropriate interior fabrics, drapes, full-colored murals, art and etched mirrors. One series of chair cars is done in Odell blues and Oregon cedar tones; another in tones of Summit green, pine brown and cedar; a third in Canyon tan; and a fourth in Shasta yellows, browns and cedar red. Spacious men's and women's lounges in all cars are done in the same general colors as the main compartment.

For maximum comfort and relaxation in the chair cars, de luxe coach seats feature extra soft foam rubber and are of the rotating-reclining type. The reclining mechanism is controlled by an Arm-Kap which is pushed to the rear ½ in. to lock the back in place. A

Exterior station for operating the luggage elevator

The three-car articulated diner-cafe-shop-kitchen unit and one of the six-wheel trucks used at articulated connections



new Hammok-Suspension provides a flexible panel to serve as a universal adapter and lend soft, firm support to the body. An individual free-turning foot rest, covered with rubber, is installed on the back of each seat and may be adjusted to any of four positions.

The diner has a carpet of blue green in a forest leaf pattern, draperies in gold, seat coverings in two tones of autumn red, and table linen in gold with autumn leaves in reds and browns.

The upper walls and bulkheads of the diner are done in cloth-backed California oak veneer as a natural background for the fall coloring. Four full natural-color murals, made from kodachromes and colored by hand, are used on the bulkheads, further complementing the color scheme.

The coffee shop of the three-car unit is in a still different color key, making it gay and informal in character. Browns, Cascade blues, and cedar red are the basic color tones. Carpets are in a fern pattern in three tones of Redwood brown, seat coverings in an attractive combination of blue and cedar, with draperies in cedar and blue. Exceptionally large murals are done in blue tones covering the entire ends of this room.

Tavern and Observation Cars

An outstanding decorative feature of the tavern car is the bar section, which occupies 18 ft. at the

(*Continued on page 500*)

The luggage compartment with shelves elevated

PARTIAL LIST OF MATERIALS AND EQUIPMENT ON THE NEW "SHASTA DAYLIGHTS"

Steel for underframes	Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
Truck frames	General Steel Castings Corp., Granite City, Ill.
Truck springs	American Locomotive Co., Railway Steel Spring Division, New York
Wheels	Standard Steel Works Div., Baldwin Locomotive Works, Burnham, Pa.
Roller bearings and boxes	Timken Roller Bearing Co., Canton, Ohio
Truck clasp brakes; side bearings	American Steel Foundries, Chicago
Shock absorbers, truck	Houdaille-Hershey Corp., Houde Engineering Div., Buffalo, N. Y.
Vibration absorption pads in equalizer coil springs, side bearings and center plates on baggage-postal cars and on chair and tavern cars; in coil springs and side bearings of articulated units	Fabreeka Products Company, Boston, Mass.
Bolster locking center pins	W. H. Miner, Inc., Chicago
Car couplers	National Malleable & Steel Castings Co., Cleveland, Ohio
Draft gear	Waugh Equipment Co., New York
Journal-box heat indicator and alarm	Fenwal Inc., Ashland, Mass.
Air brakes	Westinghouse Air Brake Co., Wilmerding, Pa.
Hand brakes (Dummy ends)	National Brake Co., New York
(Vestibule ends)	Pullman-Standard Car Manufacturing Co., Chicago
Aluminum sheets and shapes	Aluminum Co. of America, Pittsburgh, Pa
Window sash	Adams & Westlake Co., Elkhart, Ind.
Glass	Libbey-Owens-Ford Glass Co., Toledo, Ohio Mississippi Glass Co., New York Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Insulation, car	Gustin-Bacon Mfg. Co., Kansas City, Mo.
Diaphragms, inner; vestibule curtains	Adams & Westlake Co., Elkhart, Ind.
Diaphragms, outer (rubber)	United States Rubber Co., New York
Vestibule step treads	American Abrasive Metals Co., Irvington, N. J.
Floor composition	Tuco Products Corp., New York
End-door operators	National Pneumatic Co., Rahway, N. J.
Interior door locks	Pullman-Standard Car Manufacturing Co., Chicago Yale & Towne Mfg. Co. Stamford, Conn.
Interior door checks	Yale & Towne Mfg. Co. Stamford, Conn.
Heating equipment	Vapor Heating Corp., Chicago
Electric power for all purposes	Waukesha Motor Co., Waukesha, Wis.
Overhead cooling and heating unit	Trane Co., La Crosse, Wis.
Air filters	Farr Co., Los Angeles, Calif.
Batteries	Thomas A. Edison, Inc., West Orange, N. J.
Battery and brake train-line receptacles and connectors; battery-charging receptacles	Pyle-National Co., Chicago
Exhaust blowers	Westinghouse Electric Corp., Sturtevant Division, Hyde Park, Boston, Mass.
Exhaust and circulating fans; axle device, regulators, etc. (baggage-postal cars only)	Safety Car Heating & Lighting Co., New York
Motor alternators	Eicor, Inc., Chicago Safety Car Heating & Lighting Co., New York
Lighting fixtures	Luminator, Inc., Chicago Safety Car Heating & Lighting Co., New York
Annunciators and chimes	Edwards & Co., Norwalk, Conn.
Radio and public address system	R.C.A. Victor Div., Radio Corp. of America, Camden, N. J.
Venetian blinds; luggage locker interior doors	H. B. Dodge & Co., Chicago
Window-shade fixtures and rollers; ash receptacles	Adams & Westlake Co., Elkhart, Ind.
Hand-luggage compartment elevators	Viking Engineering Co., Hammond, Ind.
Chair seats	Coach & Car Equipment Co., Chicago
Vanity and loose chairs	General Fireproofing Co., Youngstown, Ohio
Murals	Kaufmann & Fabry, Chicago
Dry-ice refrigerator units	Carbofrezer Co., San Francisco, Calif.
Bar	Mandel Bros., Chicago
Table tops	Formica Insulation Co., Cincinnati, Ohio
Range, steam table, steam cooker, broiler, urns, etc.	Stearnes Co., Chicago
Cup & saucer dispensers in dining cars	Lowerator Div., American Machine & Fdy. Co., New York
Water coolers	E. A. Lundy Co., New York Westinghouse Electric Corp., Pittsburgh, Pa.
Drinking-cup dispensers	Dixie Cup Co., Easton, Pa. U. S. Envelope Co., Paper Cup Div., Worcester, Mass.
Folding lavatories	Adams & Westlake Co., Elkhart, Ind.
Hoppers	Duner Co., Chicago Crane Co., Chicago
Paper towel cabinets	Scott Paper Co., Chester, Pa.
Water-tank and steam train-line insulation	Johns-Manville, New York
Fire extinguishers	Pyrene Mfg. Co., Newark, N. J.
Paint:	
Exterior, principally	E. I. du Pont de Nemours & Co., Finishes Div., Wilmington, Del.
Interior, principally	Sherwin-Williams Co., Cleveland, Ohio

Reducing Smoke In Firing Locomotives*

A study of the methods in use at terminals on one road and a description of special equipment used

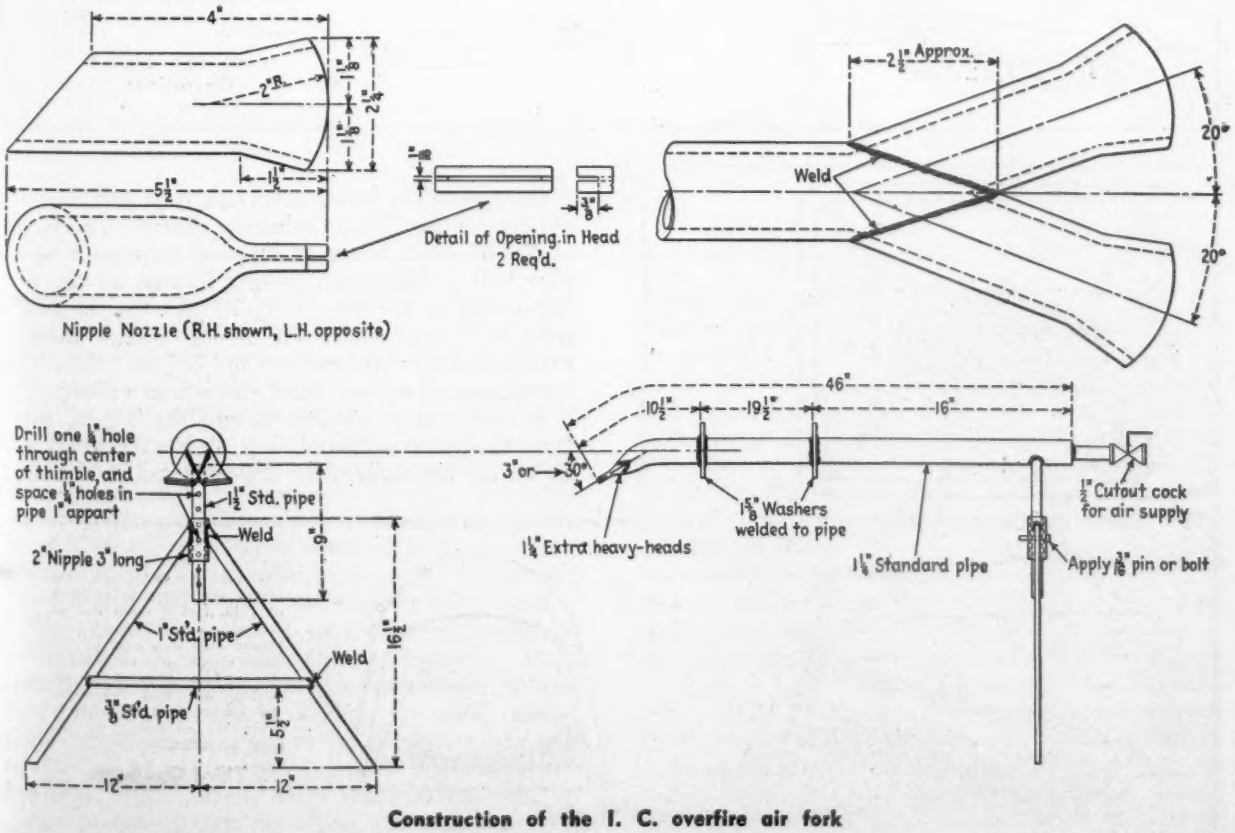
By H. E. May†

THE problem of eliminating air pollution has become more important daily since the general public, particularly in urban areas, is aware that something can be done to abate such conditions.

While a locomotive is being serviced at its terminal the cleaning of flues, grates and arches, the inspection of smoke boxes, and the testing of steam pipes and units are of most importance from the standpoint of providing proper draft and combustion. The preparation of fires must be started by placing coal in fire-boxes properly. From experience it has been found that by banking the coal along the sides and back of the fire-box 14 in. to 18 in. thick, leaving the center approximately 4 in. thick, will result in a hot smokeless fire that will not require the addition of any more coal while raising steam. The fire, when lighted, should be started through the center of the fire-box, preferably by an oil torch with treated fuel oil containing a non-smoking solution such as Nalco SR-155. The fire should be spread slowly into the banks along the sides and back of the fire-box. A smoke inhibitor such as the one mentioned will prevent an undue amount of smoke arising when it would be most likely to occur—when the fire is first ignited.

* From a paper delivered at the annual meeting of the Smoke Prevention Association of America in Birmingham, Ala., May 23-27, 1949.

† Shop engineer, Illinois Central.

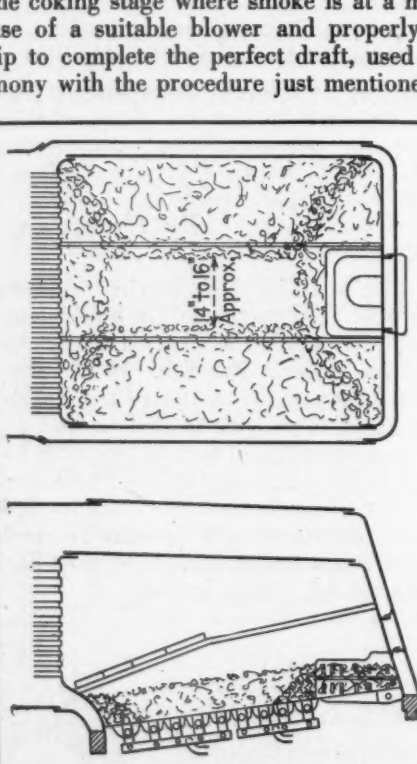


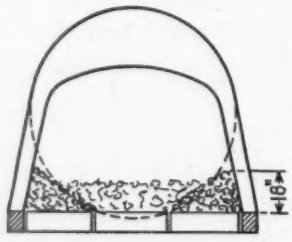
Construction of the I. C. overfire air fork

Regardless of what kind of fuel is burned, smoke will result in the closely confined quarters of a fire-box unless some means of inducing air in an appreciable amount is provided for. On the Illinois Central this has been met by supplying compressed air in the fire-box with a device known as an air fork. This apparatus has a double head, so shaped as to fan air into all corners of the box over the fuel bed. It is used in conjunction with the oil torch when the fire is ignited and until such time as the fire has reached the coking stage where smoke is at a minimum. The use of a suitable blower and properly sized nozzle tip to complete the perfect draft, used in close harmony with the procedure just mentioned will permit the firing with a minimum of smoke and fly-ash.

The use of over-fire air devices operated with steam jets is universally accepted by railroads as the most efficient means of keeping smoke down to a minimum after the fire has been ignited and steam raised. This equipment is as various in design and application as "Heinz's 57 Varieties," with many of them meriting acceptance where they will do the most good.

At this stage, however, we can get away from the problems of mechanical equipment and concentrate on problems of operation, or the man who is using this equipment. How well he uses it depends upon how well he is instructed and how much interest you can get him to develop in abating smoke. I think you will all agree with me that the best smoke abatement device is a fireman who is honestly trying to abate smoke. Besides selling him on the idea that we can provide smoke prevention devices that will help him do a better job, he must be instilled with the idea that his contribution to the cause of less smoke is an important one and is directly related to his ability. Some are aware of this and strive toward perfection while others will not go along with any method of firing without being continually policed.



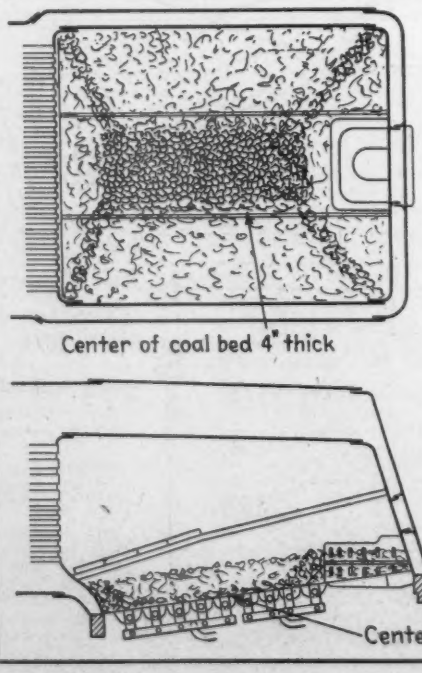


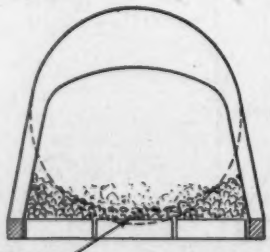
The firebox is inspected by means of illumination from ignited oil-soaked waste (first operation), coal is shoveled into the firebox so that it is distributed to a height of 18 in. at the sides and ends with a natural slope towards the center leaving a vacant area 14 in. to 16 in. wide.—A wad of ignited oil-soaked waste is now thrown onto the right-hand sloping bank of coal for illumination during the third operation.

First and Second Operations

On most of our locomotives equipped with over-fire air devices, two 3½-in. tubes are placed on each side of the fire-box. Steam is supplied through a ½-in. pipe with a valve conveniently located on the fireman's side in the cab. A ½-in. pipe cap is drilled with five 1/16-in. holes on 30-deg. angles through which the steam passes into the 3½-in. tubes. This creates a good suction of air and acts as a silencer.

A cast iron elbow forced into the 3½-in. tubes from the inside of the fire-box directs the steam and air on one side toward the fire-door and on the other



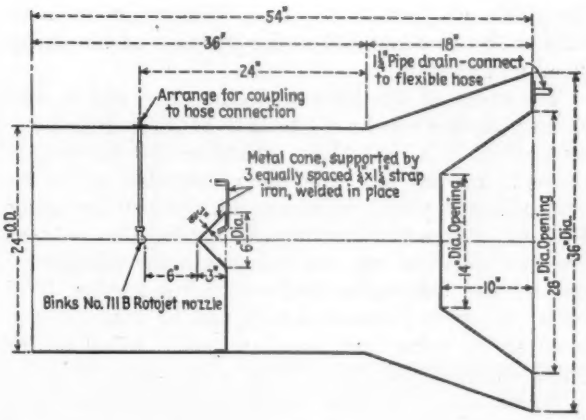


Coal is shoveled onto the vacant grate area to a depth of 4 in. and a small wad of ignited oil-soaked waste thrown onto this layer of coal just ahead of the stoker stand.—This illuminates the firebox for final inspection and serves as a pilot fire to ignite the oil burner for the next operation.

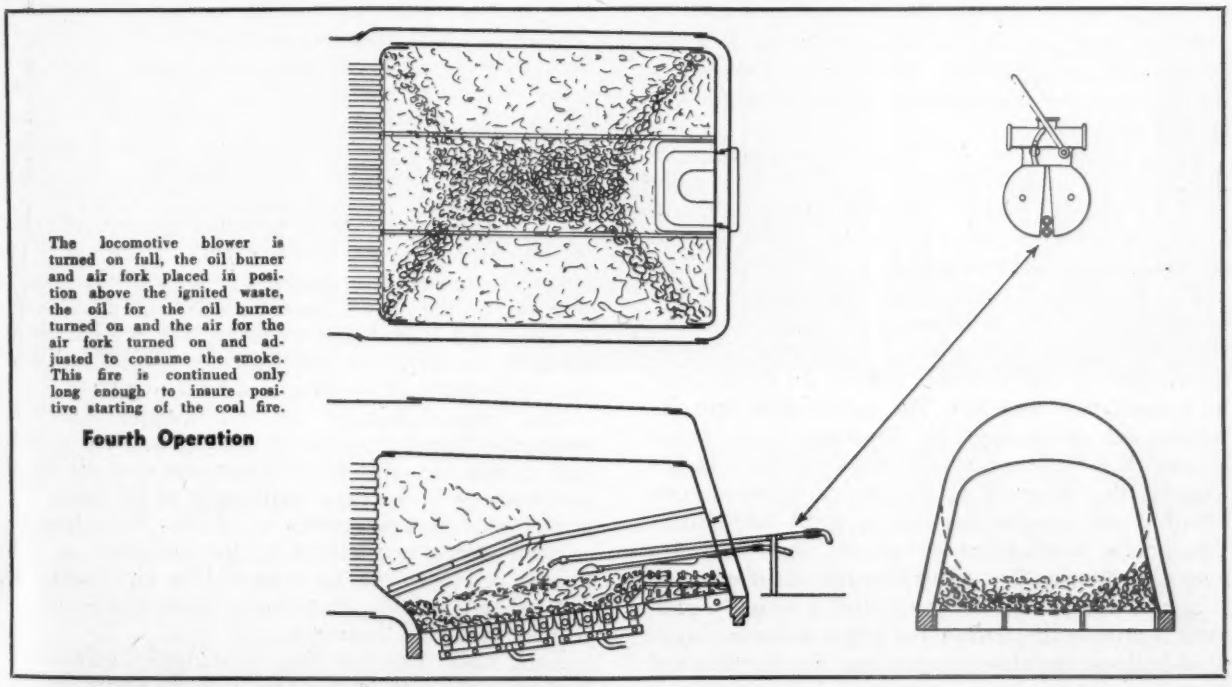
Third Operation

side of the fire-box toward the flue sheet, creating a whirling action over the fire which causes the hot gases to be mixed thoroughly with air and practically all combustible matter burned before passing over the arch to the flues.

At one point on the I. C. considerable research was carried out in an effort to arrive at some means of preventing the spreading of fly-ash and soot from locomotive stacks while cleaning or knocking fires. A so-called smoke suppressor or scrubber was developed that fits over the top of the stack when the locomotive is placed on the cinder pit. This device is constructed of 3/16-in. steel, approximately 4 ft. high, and is bell shaped at the bottom. An inner flare enables this device to fit snugly on top of the stack. Near the top of the device a 3/8-in. water connection leads to a Binks spray nozzle situated in the center of the barrel. High-pressure water discharged from this nozzle



Sheet-metal smoke suppressor of all-welded construction



The locomotive blower is turned on full, the oil burner and air fork placed in position above the ignited waste, the oil for the oil burner turned on and the air for the air fork turned on and adjusted to consume the smoke. This fire is continued only long enough to insure positive starting of the coal fire.

Fourth Operation

forms a water curtain which traps the cinders, soot and fly-ash particles as they rise upward and washes them into the lower bell and hence to the ground. This has proved satisfactory.

At the point where this device was developed and is now in use we are handling from 12 to 14 locomotives a day and all radial tracks are equipped with smoke scrubbers to be used when blowing flues, holding or building fires. Analysis of the discharge gives proof of its effectiveness by virtue of the large amount of carbon and fly-ash washed from the smoke and gases and carried away in the water to the ground.

The principles involved in combating smoke on locomotives are also applicable to stationary boiler installations. Most railroads have installations of relatively small units, 150 to 300 hp. For these smaller units the steam-air over-fire jet is particularly well adapted as an aid in abating smoke. It can be made by local forces usually from material on hand, is cheap compared with the all-air jets that require a motor- or turbine-driven fan and can contain the basic principles of design that have been worked out by others.

The secret of success is to get the jets so sized and so located that they will do the most good with he least amount of steam. By the "most good" I mean primarily to secure the greatest turbulence in the furnace at the hottest zone. This applies to hand-fired as well as stoker-fired boilers. It is well to remember in laying out a job that some convenient way should be provided for the operating personnel to keep the steam jets clean and to renew them when it becomes necessary. Another point to consider is the steam operating pressure on the jets. If the pressure is too high at the header or supply, a reducing valve should be installed, perhaps a locomotive steam heat reducing valve. Also the steam should be as free from moisture as possible. We recently found it necessary to install dry pipes on some small return tubular boilers to secure a better quality steam in spite of

the drain we had on the line. Wet steam tends to clinker the fire and defeat the purpose of obtaining good combustion.

The noise of jets both on locomotives and in stationary boilers can be a nuisance and its elimination or reduction is desirable; otherwise the fireman is prone to use the jets only when compelled to do so. In stationary plants noise can be reduced by using long air intakes and locating the openings away from the furnace front but this cuts down the velocity of the air and makes the steam jet work harder. It is better to apply silencers which can be made in the local shop, using rock wool or some other sound absorbent material.

As mentioned before, in applying these jets to a furnace, a dry source of steam must be secured, drains or traps provided in the line, and the lines insulated. When jets are applied through the boiler fronts of a hand-fired installation, care must be taken to see that the jets do not extend out from the fronts too far or they become a safety hazard to the fireman. Jets applied in the bridge wall must be pitched upward toward the front sufficiently to avoid blowing cinders out the door.

When two or three boilers are set in a single setting the problem of installation becomes a little more involved if bridge wall jets are used. On three boilers in a single setting we use a continuous tunnel through all three bridge walls to get air to the center boiler.

The maintenance of over-fire air jets is like the maintenance of any other equipment. They must be checked regularly by the plant engineer or some assigned person, and whatever defects are found must be immediately remedied. The tube outlets into the furnace are apt to slag over, especially if the steam is shut off for any appreciable length of time. If this happens the efficiency of the jets is drastically reduced. Some installations have a small hole drilled through the steam valve seat so that there is always a small protecting flow of air through the tubes.

Smoke recording, indicaing and warning equipment is now on the market. For either stoker or hand-fired boilers, electric-eye equipment can be obtained to control uptake dampers or other factors influencing combustion. A plant having such equipment not only has an ever alert mechanical smoke inspector but also obtains a continuous picture on the chart of what has happened and when. In installing this equipment it is better to place the electric-eye as close to the furnace as possible to avoid the time lag when the eye is placed in the stack.

Inasmuch as stationary boiler installations on railroads are relatively small in capacity the problem of eliminating fly-ash from stacks does not, as a rule, involve the use of cinder traps on fly-ash arrestors. At the points on the I. C. where equipment of this type is used, provisions were made to return cinders and fly-ash to the fire-box, where the combustible is burned. In gereral, however, ample combustion space provided for the load to be carried and the regulation of the fuel and air supply to a careful adjustment will result in little trouble being encountered from excessive fly-ash and cinders.

S. P. "Shasta Daylights"

(*Continued from page 496*)

central portion of the car and is brilliantly illuminated from an overhead canopy. The bar front and canopy have wood panels showing animal life of the Northwest. At the back bar, between glistening display cases, is an illustrated transparency in full natural color, made from a photograph of Timberline Lodge. Two 27-seat sections, one on either side of the bar, are done in blue, cedar, Monterey-finished wood and pale yellow.

In the 80-ft. parlor-observation car, interior walls and ceiling are in four tones of blue. Foam rubber seats, upholstered in henna or blue, revolve and recline. Soft carpets in three tones of brown, decorated with a leaf pattern, are laid on a pad of sponge rubber. Photo murals depict "Shasta Route" scenes.

The forward end of this car includes rest rooms, adjoined by a luggage compartment. Card tables for eight persons, writing desk and magazine table are set off from the main parlor section which has seats for 22 persons with individually controlled as well as general fluorescent lighting. The observation circle at the rear of the car has settees and chairs for 10, and reading tables.

The entrance door of the parlor-observation car, as on all other passenger-carrying cars of the train, is electro-pneumatically operated. A warning light mounted on the rear of the car projects an oscillating beam of red light backward along the track (when actuated manually, or automatically due to application of brakes), as warning to a following train.

The "Shasta Daylight" cars are equipped with the automatic Vapor temperature control located in the end of each car. Automatic thermostat controls keep temperatures in the cars comfortable at all times, no matter what the temperature is outside. When heat is needed, steam is admitted to the radiators as required, and when cooling is needed the air-conditioning system automatically turns on, as the train moves, without manual adjustments.

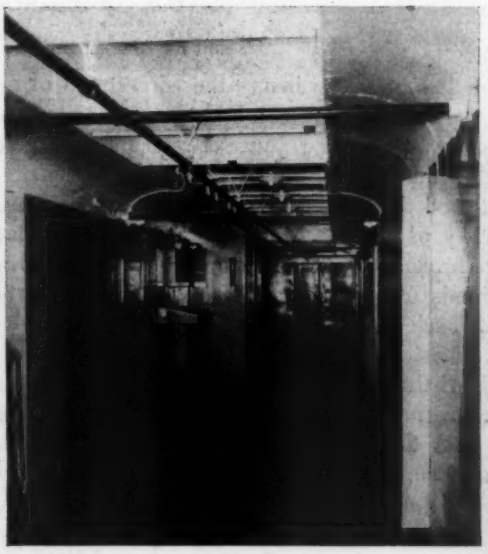
Each chair car has five individually controlled heating zones, with separate thermostats which anticipate and modulate the heat in each zone.

When the temperature in the car drops a fraction of one degree below the comfortable thermostat setting, the thermostat electrically opens the heat valve allowing a little heat into the aluminum-finned radiators until the temperature is restored. When temperatures in the cars rise above the comfortable setting, thermostats turn on the air-conditioning equipment.

Each car is equipped for radio. Multi-channel radio tuners, both for A.M. and F.M. reception, are located in several of the cars to offer a wide selection of programs over the route of the train. To facilitate train announcements, the radio system is linked with a public-address system controlled from a majority of the chair cars, or from the conductor's desk.

Forty-eight-seat chair cars carry five speakers in the ceiling, while the 46- and 38-passenger cars have four. Four speakers also are located in the tavern car, parlor-observation car, and in the diner and coffee shop sections of the three-car articulated dining unit.

Tourist Car Converted to Baggage Car



Above: Interior of Monon baggage car — center: Express-messenger unit built of Met-L-Wood—Right: End recessed to accommodate Miner hand brake

EARLY this year, the Chicago, Indianapolis & Louisville converted a Pullman tourist car, No. 1522, built in 1917, into a baggage car equipped with an express-messenger unit, said to be the first conforming exactly to A.A.R. specifications approved by Mechanical Division letter ballot as of September 3, 1948. The conversion work was done at the company's shops, Lafayette, Ind.

The window sheets of the old car, badly corroded, were removed and new steel sheets applied over the posts by welding. Letter board molding was removed and letter boards riveted to the new sheets. Door posts were relocated alongside the vestibule collision posts, welded in place, and tied to the vestibule collision posts by welding ¼-in. steel plates. This forms a stronger end than with a vestibule. Steps were removed and side sills extended to vestibule corner posts, eliminating the vesibules. One car end was recessed to provide clearance for a Miner hand brake.

The car sides were insulated with 3-in. of Fiberglas and sheeted with 16-gauge steel. The lavatory, clothes locker and electric locker were constructed of ½-in. Met-L-Wood. Doorways were edged with aluminum extrusions. End doors were salvaged from U.S. Government hospital unit cars recently converted. Side doors, made in the Lafayette shops of 3/16-in. aluminum sheets, are fastened to both sides of extruded aluminum channels with self-tapping screws. They can be opened and secured at eight locations.

Lights in the original car were left in place and bowls removed. Bulkhead screens were retained in the clerestory. The water system was piped to a wet hopper, lavatory wash basin and the original water cooler. The axle generator was left in place and the switchboard taken from a hospital kitchen car now used as a head-end caboose. The interior was painted mail-car green with the upper section white. The trucks axles were converted to 5½-in. by 10-in. for an increased capacity of 60,000 lb. The light weight of the car is 143,600 lb.

EDITORIALS

The Standard Journal Box

In his address before the annual meeting of the Mechanical Division of the A.A.R. at Chicago on June 27 last, G. Metzman, president, New York Central System, in speaking of the new research laboratory being built for the Association on the campus of the Illinois Institute of Technology, said: "This new laboratory will have many important tasks, but it can pay for itself thousands of times over if it can help solve just one of these, 'the hot-box problem.' I find it impossible to believe in this era of development of atomic energy, of electronic 'brains' and other triumphs of science and engineering, that we must forever put up with something which is seemingly so simple as the hot box. Somewhere, somehow—and the sooner the better— there must be found a practical and economical, means of eliminating or reducing to insignificance one of the great and traditional curses of the industry, *our wasteful troubles with journal bearings.*"

Among the perennial problems associated with running trains on railways the hot-box problem is one of the leaders. It has been the subject of study and discussion for many years, and Mr. Metzman's comment makes it clear that it is not a problem studied and discussed alone among the officers and supervisors of the car department, who have to deal with it most directly.

Simple as is the standard car journal box, with its wedge, brass and saturated waste packing, its successful performance is a complex problem which is generally considered to involve a whole chain of details, including the condition of the journal bearing, of the bearing surface of the brass, of the wedge, and of the bearing of the wedge in the box, before coming to the details pertaining to effective lubrication of the bearing. These include the quality of the waste, the viscosity of the oil, the correctness of the application of the wastes to the box, and adequate attention en route to see that what was a correctly conditioned journal box at the terminal of departure remains in that condition to the end of the trip. The importance of each one of all of these factors in the successful operation of standard journal boxes has been reiterated repeatedly in discussions of this subject among car men. Indeed, there is little doubt but that, were it possible to insure the correctness of all of these details under all conditions on all railroads, the present wastepacked journal boxes might give very little trouble.

But at more or less frequent intervals for any one of a variety of reasons, some link, or links, in this chain are broken, with the kind of results which stick in the minds of railway presidents and bring forth comments such as those of Mr. Metzman at the Mechanical Division meeting.

Are all of the links in this chain equally susceptible to failure? If so, then the conclusion might be justified that the demands of modern train service had become so severe that the reserve of capacity of the standard journal box had not only been used up, but had been exceeded. But the answer to this question is not necessarily yes. Are not many of the failures which are attributed to minute variations of the mechanical features of the box from perfection caused by a primary inadequacy in the lubrication of the bearing? If oil of the quality desired were fed to the journal in any way which would always insure an adequate film of lubricant between the surfaces of the journal and brass, it seems probable that much of the touchiness attributed to the mechanical conditions within the journal box would drop into the background.

Is not the crux of the problem the effective application of the lubricant?

Re-Using Diesel Lubricating Oil

In view of the urgent need for conserving Diesel locomotive lubricating oil and thus reducing costs, railroads are giving increased attention to the entire subject of lubricating-oil specifications, qualities, use of additives, mixing of oils, frequency of crankcase drainage and reclamation or re-refining of crankcase oil. The distinction commonly made between the two latter terms is that reclamation utilizes centrifuging, mechanical filtration, etc., to remove contaminants such as water and solid substances, but not fuel oil dilution or other products of decomposition. Re-refining on the other hand uses activated earth, vacuum distillation, steam stripping, etc.,

to do a complete job and restore practically all the characteristics of new oil.

Obviously, to accomplish such a highly desirable result, the process must substantially parallel the original refinery practice and employ essentially the same schedule of operations only on a much smaller scale. A number of railroads have installed equipment to do just this and use the resultant re-refined oil satisfactorily in all classes of Diesel locomotive service. In fact in some instances results have been better than with new oil.

Diesel crankcase oils become physically contaminated in service with dust and dirt from intake air, moisture, abraded metal particles and carbon. Most of these contaminants can be filtered out, but lubrication experts say that chemical changes in the oil due to high temperatures, oxidation, and the presence of acids created by heat and moisture, also possibly by catalytic action, are much more difficult to counteract.

Physical and chemical impurities in Diesel lubricating oil may be and generally are formed at the same time, but at different rates, depending upon the type of engine, fuel and operating conditions. The resultant sludge, which accumulates in the crankcase, contains most of the physical and some of the chemical impurities and these must be removed before the drained oil is suitable for re-use.

If the re-refining of used Diesel engine oil and complete removal of both physical and chemical impurities seem like a difficult undertaking, it should be remembered that crude oil in its natural state contains dirt, light and heavy oils, carbon, waxes, tar, entrained moisture, etc., and yet modern refinery processes change this dirty raw material into fine, clear lubricating oils for American industry. Since most authorities agree that oil does not "wear out" and lose its lubricating properties as a result of use, but owing to the pickup and development of impurities, it is not surprising to find that efficient equipment and processes have been developed to remove impurities, and restore it to a condition satisfactory for re-use.

From 60 to 41 Radio Channels

On May 17, 1945, the Federal Communications Commission allocated 60 clear radio frequency channels to the railroads for train communication. Since that time, installations have not been made at a rate which seems in keeping with the advantages offered by such equipment. There are a number of reasons for this. Many of the advantages are intangibles, and it is difficult to put a dollar value on the returns to be obtained. Many investments for railroad equipment can be shown to yield a high return and management is reluctant to make commitments unless the figures show how much can be saved in dollars. Always too, there is the fear that once communication equipment is installed, other demands for power on the caboose will appear. The natural result is that some prefer to mark time and wait to see what others will do.

Technically, the communication equipment itself, be it inductive or space radio, seems to offer little difficulty. A greater problem is presented by the apparently more simple equipment required for caboose power supply. The railroads are still looking for something which can meet all operating requirements, including those imposed by pooled and assigned cabooses, which can be installed at a moderate cost.

On July 1, 1949, the F. C. C. reduced the number of radio frequencies allocated to railroad service, stating that in its opinion 41 frequencies in the Chicago area and 39 elsewhere are sufficient. There is in this the implication that the railroads, in the opinion of the Commission, have not been doing enough to justify the channels assigned to them. In view of the Commission's intimate knowledge of radio applications, this is probably not the case, and the situation is actually being eased by the new equipment which is now being offered by the manufacturers.

When the original 60 channels were assigned, it was expected that alternate channels only would be used in any congested area like Chicago. Manufacturers are now offering radio equipment for adjacent channel operation and, if this proves practicable, it will increase the number of channels which can be used in a given area from 30 to 39. Thus the actual communication equipment will afford no greater difficulties. For road service; caboose power remains the number one hurdle.

Converting to Oil May Save Money

While a good deal of thought and discussion has recently been devoted to the price of Diesel fuel oil and coal, a big change has taken place in the price of heavy fuel oil which can have a substantial effect on future consumption of the three principal fuels for motive power. Except for railroads in oil-producing areas, and a few outside of these areas, the tremendous drop in the price of the heavy residual fuel oil used in steam locomotives has gone virtually unnoticed. It has dropped, in some cases, to only one-half or even one-third the price it brought last winter.

Where it formerly cost on an average of nine and more cents per gallon in the midwest, the price has dropped to around four cents loaded on the tender, including all transportation and handling charges. It is now low enough in price to be competitive with coal in areas well outside the petroleum-producing parts of the country.

The operating advantages of oil-burning over coal-burning steam locomotives are well known. In a given tender space and capacity, the amount of fuel oil that can be carried will move a train further than if the space were devoted to carrying coal. Fires do not have to be cleaned en route on long locomotive runs. The savings in maintenance, the increase in horsepower, and the gain in availability can be appreciable.

The above are but a few of the long-known advantages of oil-fired power. Additional advantages have also been added during the last few years. Freedom from being penalized by recurring coal strikes, or reduced work weeks, is one. The main new advantage, however, is that the heavy fuel oil is not only now plentiful and promises to stay plentiful, but that it is cheap.

Unless present refining methods can be changed far more radically than appears likely, the increased use of the light distillate oils, such as Diesel fuel oil and home heating oil, should make the heavy fuel oil continually more abundant. When a given amount of crude is refined, certain percentages are obtained of lubricants, gasoline, distillates and residual fuel oil.

While these percentages can be varied to some extent to suit the relative demand for each of these products, there is a practical limit beyond which it is not economical to go.

Therefore, continually increasing consumption and, consequently, refinement of distillate oils leaves more and more residual to be placed on the market, and it should be plentiful all year around. In summer, heating loads performed by heavy fuel oil will be non-existent. In winter, the home-heating consumption of light oil rises, thereby causing an additional amount of residual oil to be available because more crude must be refined.

Shortages of residual fuel should not be a problem in the event of a national emergency. Such an emergency would call for tremendous use and refinement of distillate oils and gasoline, leaving vast quantities of residual oil to burn in locomotives. Dependence on an industry controlled and dominated by one man would be avoided. This eliminates curtailment of trains in prolonged coal strikes and increased fuel costs occasioned by stockpiling, with its attendant added handling, as a hedge against such strikes. Even if occasions arose were stockpiling of residual fuel oil became a necessity, the added handling required would be a smaller and less costly operation than with coal.

Locomotive Statistics

It is worthwhile, in summary at least, to place on record for those who are concerned with the maintenance of motive power the figures which indicate the rapidly changing trends in the character of the locomotives in service in this country and the relationship in the matter of the work performed. For a year or two after the end of the war, when the railroads went into motive power replacement programs in a large way, the orders were predominantly in the direction of the Diesel locomotive and it is doubted if the average mechanical man has a full realization of the effect of these post-war orders on the overall motive-power picture except as it may apply to condition on his own road.

One of the best indicators of the use of motive power is the figure that has to do with the assignment of power to various classes of service. This indicates not only the ownership but the relation of that ownership to current business conditions. In the matter of yard switching, for example, the steam locomotives assigned to this service for the first five months of 1948 and 1949 dropped from 9,966 to 9,030 while the Diesel increased from 3,151 to 3,941. The total number assigned was reduced by the process from 13,117 to 12,971, maintaining as usual a replacement ratio greater than one-to-one. It is interesting to note, however, that as more and more switching jobs are taken over by the Diesel the replacement ratio for the Class I roads in total is gradually approaching the one-to-one ratio.

In road freight service the Diesel locomotives increased from 1,108 to 1,777 while steam declined from 19,588 to 18,291. Road passenger service likewise saw an increase from 685 Diesel units to 844 while the steam units assigned to this service dropped from 5,135 to 4,533. These figures are all for the first five months of 1948 and 1949.

The mileage operated by the motive power units brings out some still more significant figures: in spite of the fact that, in road freight and road passenger service particularly, the portion of the motive power inventory and the assignments to these classes of service is still relatively small in percentage, the locomotive mileage run by the Diesels is rapidly mounting to substantial proportions. These are indicated by the figures for the first five months of 1949 in which period the Diesel handled 46 per cent of the yard switching hours, 32 per cent of the road freight locomotive miles and 71 percent of the road passenger locomotive miles. With the further replacement of some of the steam power that is obsolete in character by modern Diesels we may soon reach the point where the Diesel is running as much passenger mileage as steam.

SHOPS AND TERMINALS

Cool-Down System Of Boiler Washing*

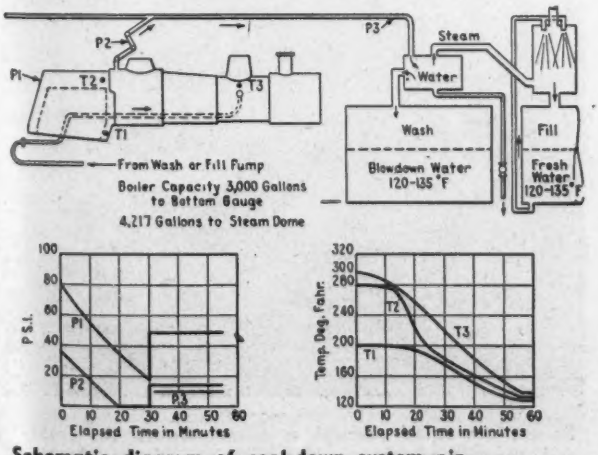
Boilermakers have recognized for a long time that boilers should be heated and cooled gradually. The higher pressures and higher temperatures used in the latest steam locomotives, and the large size of the boilers make sudden cooling during washouts a destructive procedure which results in broken staybolts and leaky side sheets. Therefore, the operation of the cool-down system for boiler washing, as witnessed by a committee of the Master Boiler Makers' Association, is presented for comparison.

Northern Pacific Demonstration

At the Minneapolis, Minn., enginehouse of the Northern Pacific, the cooling down and washing out of that railroad's 4-8-4 Class A-3 locomotive boilers was demonstrated. One of these, No. 2664, was used in this test. This locomotive is equipped with roller bearings and designed for either freight or passenger service. Its boiler has top checks and the usual V-shaped baffle below the boiler water inlet opening. It carries 260 lb. per sq. in. working pressure, and when it arrived in the house for washout it had 200 lb. per sq. in. pressure in the boiler. The handling of this boiler during the washout is shown by the log of the test shown in the accompanying table.

There were no leaky staybolts in the firebox at any time during this cool-down test. Contraction appeared to be uniform. There was no indication of any sudden sharp contraction movements during the cool-down which are usually noted when boilers are blown down hot.

* Abstract of a committee report presented at the 1948 annual meeting of the Master Boiler Makers' Association.



Schematic diagram of cool-down system piping and test results on middle-western railroad

Piping connections for cooling Great Northern boilers

Great Northern's Experience

The Great Northern has had considerable experience with the cool-down system of boiler washing and report that they are highly satisfied with the results and would not consider returning to the previous practice of using the hot blow-down method. Previously the road had experienced considerable difficulty with broken staybolts and had many cool-down leaks. They now report that a broken staybolt is almost unknown and leaking has been eliminated. To receive the ultimate benefits from the cool-down method, all boiler feed water must be properly treated.

The Great Northern system is slightly different from that used on the Northern Pacific, although the principle involved is identical. The St. Paul enginehouse of the Great Northern is equipped for direct steaming. This railroad preferred to blow down the steam from the boiler to the washout plant prior to circulating cooling water through the boiler. The locomotives have a valve on top of the boilers, and the enginehouse is piped with an overhead blowdown line and a separate cooling-water line. These

Connections for cooling and draining Northern Pacific boilers—Hose at rear of firebox furnishes cooling water through a branch pipe and overhead checks.—Boiler draining pump is connected through hose to both right and left blow-off cocks

LOG OF TEST ON N. P. LOCOMOTIVE NO. 2664

Time (A.M.)	Pressure, lb. per sq. in.	Water level in Glass, in.	Remarks
9:50	200	2	Injector started.
10:00	122	6	
10:05	102	Full	Injector broke at 100 lb. per sq. in pressure. Feedwater pump started until house line connected.
10:10	90	..	House line turned on with water at 86 deg F. Blow-off cock opened through house blow-down system.
10:15	80	½ from top	
10:25	60	1 over top	
10:35	45	2 over top	Boiler had contracted gradually, 1⅛ in at rear furnace bearer.
10:40	...	..	Blow-off cock closed and boiler filled. Water from top vent at 10:43.
10:45	32	..	
10:48	125	..	Pressure equal to house water-line pressure. Blow-off cock opened and pressure dropped to 40 lb. per sq. in. Boiler draining pump connected through Y-connection to both side sheet blow-off cocks. Valves opened and pump started at 10:57. Cooling water still running into boiler.
11:15	20	At top	
11:20	15	1 from top	
11:30	0	3 from top	
11:30	0	3 from top	
11:33	...	..	Cooling water turned off. Drain pumps still running.
11:38	...	Bottom of glass	
11:40	...	..	Top plugs removed. No steam vapor showing. Water temperature through pump estimated at 135 deg. F. Contraction at rear furnace bearing ⅞ in.
11:42	...	..	Washing started through top plugs and continued until boiler was drained.
1:45 P.M.	...	..	Washing and internal inspection completed and plugs replaced. Contraction at rear furnace bearing 1⅛ in.

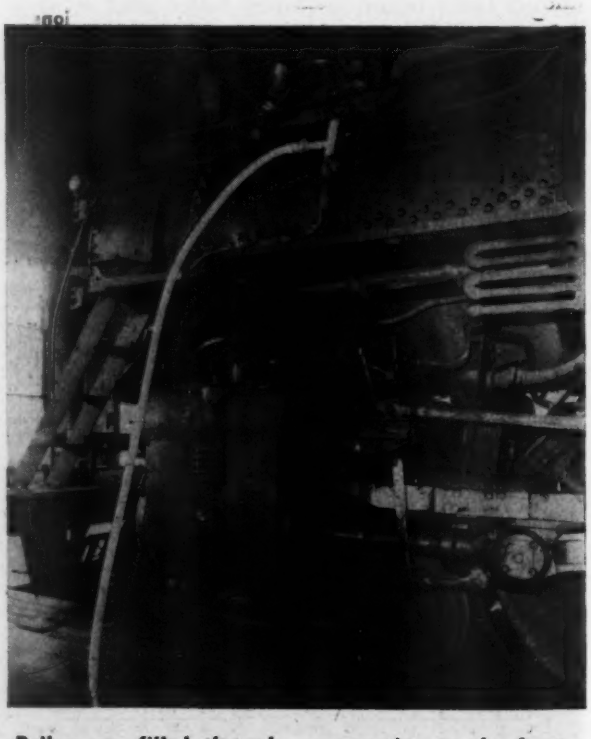
pipes are tied in through separate valves to a common ball-joint fitting at each stall that can be joined to the top blow-down connection when needed.

A boiler that is ready for boiler wash is connected to these overhead lines. The blow-down line valve is opened first and steam is blown off through this line until the boiler pressure is reduced to 50 lb. per sq. in. Then the blow-down line valve is closed and the cooling-water valve opened. Care is taken to see that the boiler is filled well over the top of the glass before steam is blown off, because in this process six to eight inches of water is lost in making steam and, of course, to get full benefits from the cooling system, all heating surfaces must be kept submerged until cooling is completed and washing can be started.

Cooling water is circulated into the top of the boiler and boiler water forced out of the lower part of the boiler through the blow-off cock and its ball joint connection back to the washout plant until the boiler is cooled to 100 deg. F., or approximately the temperature of the washwater. When cooling is completed, a boiler draining pump is connected the same as shown previously and washing carried on as the water level recedes in the boiler the same as previously described.

The committee was greatly impressed with the dispatch with which boilers can be handled with the cool-down system. It had been anticipated that this method might delay the handling of the locomotive but there was evidence that this method will actually result in a saving in time. At the Northern Pacific Locomotive No. 2664 was ready to fire two hours earlier than would have been the case under the old practice. This is a direct comparison as the Minneapolis enginehouse is just starting the cool-down system at that point.

Working conditions for the boiler forces are much improved by the cool-down system. The boiler is cooler when the men go into the firebox to blow flues, work on the arches and grates or to do other necessary work. Water-treatment engineers say that the cool-down system is of real advantage from the treatment standpoint also. When sludge, which is present



Boilers are filled through a connection to the front-end throttle which provides washing of the throttle box and superheater units after each boiler washing

in all boiler waters, settles onto heating surfaces, it will not adhere where the cool-down system is used and may be readily washed off. If the boiler is blown down hot there is every probability that this sludge will bake onto these surfaces as the water recedes and this baked-on sludge forms a scale that cannot later be removed by usual treatment methods as the chemical ingredients have already reacted with the softening treatment. Washing the boiler promptly as the water recedes from a cooled boiler prevents this sludge from forming a scale coating and insures the maintenance of clean heating surfaces which, of course, will also help to keep the cost of boiler repairs at a minimum.

The members of the committee were C. A. Harper, chairman, general boiler inspector, C. C. C. & St. L.; M. R. Barclay, vice-chairman, general boiler inspector, N. P.; M. C. France, general boiler foreman, C. St. P. M. & O.; F. E. Goodwin, mechanical inspector, C. N.; V. E. McCoy, chief engineer, National Aluminate Corp.; H. H. Niemeyer, general boiler inspector, C. B. & Q., and A. P. Robersen, district boiler inspector, G. N.

Magnafluxing Driving Tires

The device illustrated, made at the Bayshore, Cal., locomotive shops of the Southern Pacific, is used for the quick and convenient Magnafluxing of driving wheel tires. It consists of a 10-in. I-beam inbedded in the shop floor and extending 8 ft. 5 in. above the floor with two 9-in. flanged ball-bearing rollers set about 2 ft. apart at the upper end of the I-beam. One of the rollers is connected to an air motor to enable the tire to be rotated during the process of Magnafluxing. At the upper end of the I-beam is a 4½-in. guide roller, and on the lower end near the floor a 10-in. by 61-in. by 21-in. deep tray is placed for collecting Magnaflux powder which can be re-used as required.

Device for revolving tires while Magnaflux testing

In getting ready for testing, a tire is placed on the supporting rollers with the back face of the tire touching the roller flanges and the front, bearing lightly against the guide roller. Three turns of No. 0000 magnaflux inspection cable are placed around tire. The Magnaflux machine is set at 500 amp. and as the air motor slowly turns the tire, gray Magnaflux powder is sprinkled on the bore of the tire ahead of the cable. Unused powder is brushed or blown down into the tray from which it is withdrawn at the bottom slide.

By the use of this device in Southern Pacific shops, 17 defective tires were discovered during 1948 which would not have been detected by normal inspection.

Maintenance of Locomotive Valve Pilots

At the Sacramento, Calif., general shops of the Southern Pacific, locomotive Valve Pilots are reconditioned for the entire Northern district which covers the territory west of Ogden, Utah, to Oakland, Calif., and south of Portland, Ore., to Fresno, Calif., and occasionally a few from points on other districts of the system.

In the course of a year, an average of 137 instruments pass through the Valve Pilot department for periodic check-up and overhaul. Each unit receives this attention approximately every 12 months. Due to the extreme delicacy and close tolerances involved, no attempt is made to repair detail parts, all replacement parts being purchased from the manufacturer.

The service obtained from each instrument is directly dependent upon the care and maintenance it receives. As this equipment serves as a factor of great importance in the safe operation of trains, it is necessary that it be given preferred attention in this maintenance. Southern Pacific experience indicates that the friction drive wheel is subject to the greatest amount of wear, while the cam box operating from the valve motion wears least, providing it receives the proper lubrication after leaving the shops.

The speedometer is the most delicate part of the equipment and utmost care must be taken in maintaining it in an accurate operating condition. The speedometer is placed on the calibrating machine, especially made for the purpose by the manufacturer

Test rack, tools and bench for repairs to locomotive valve pilots

and is adjusted to coincide with the reading of the master gauge on the calibrating machine. If accurate adjustment cannot be obtained, the instrument is carefully inspected and checked for worn parts which are replaced with the new purchased items. On some of the more intricate parts, one-half thousandth of an inch wear will necessitate renewal of the part. The speedometer is again checked against the master gauge of the calibrating machine and adjusted to minute accuracy.

Similar attention is given the valve cut-off indicator which is adjusted to coincide with the mile lines printed on the tape. After installation of the equipment on the locomotive, the cut-off indicator is further adjusted so that the cam in the gear box is accurately synchronized with the position of the valves.

At no time must any lubricant other than SAE No. 10 oil be used in this equipment. If a heavier oil is employed the results will be the same as if no oil whatever had been used due to the extremely close fits between shafts, bearings and other component parts.

Caution must also be exercised when the locomotive is being washed to prevent water from coming in contact with the delicate parts, for the smallest amount of rust can greatly effect the operation.

All replacement parts are stored in a compact drawer-type cabinet which is but approximately 3 ft. wide, 2 ft. high and 2 ft. deep and is conveniently located adjacent to the speedometer calibrating machine. Each drawer is divided into many small compartments depending upon the size and shape of the part and the number required to keep on hand. On the opposite side of the calibrating machine is located a rack for storage of the speedometer instruments during their stay in the shop which holds eight units. Immediately in back of these facilities is the work bench for inspection and renewal of parts.

Questions and Answers

The question and answer department is included for the benefit of those who may desire assistance on problems involving matters pertaining to the operation or maintenance of air brakes, Diesel-electric locomotives, steam locomotive boilers or steam locomotive practice. Any inquiry should bear the name and address of the writer, whose identity will not be disclosed unless special permission is given to do so. Anonymous communications will not be considered. Inquiries addressed to this publication will be referred to the source from which an authoritative answer can be secured.

Steam Locomotive Boilers

By George M. Davies

Welding Tube Sheet to Firebox

Q.—When butt welding a 5/8 in. tube sheet to the firebox crown and side sheets which are 3/8 in. thick, should the plates be formed flush on the fire side or the water side of the plates in preparation for welding?—F.E.M.

A.—The general practice is to weld the firebox plates from the inside of the firebox thus the plates would be lined up flush on the water side of the plates.

The A.S.M.E. Boiler Construction Code, Section III covering Rules for the Construction of Locomotive Boiler—L-104—Preparation for Welding:

(a) The plates may be cut to size by machining or shearing, or by flame cutting. If shaped by flame cutting, the edges must be uniform and smooth and must be free of all slag and scale accumulations before welding. The discoloration which may remain on the flame-cut surface is not considered to be detrimental oxidation.

(b) If the thickness of a flange to be attached to a cylindrical shell by a butt joint exceeds the shell thickness by more than 25 per cent (maximum 1/4 in.) the flange thickness shall be reduced at the abutting edges either on the inside or outside, or both.

(c) The edges of the plates at the joints shall not have an offset from each other at any point in excess of one-quarter of the plate thickness at the joint, with a maximum permissible offset of 1/8 in. for longitudinal joints and 1/4 in. for girth joints.

(d) In all cases where plates of unequal thicknesses are abutted, the edge of the thicker plate shall be reduced in some manner so that it is of approximately the same thickness as the other plate.

In longitudinal shell joints the middle lines of the

plate thicknesses shall be in alignment within the fabricating tolerances specified in (c) above.

Application of Syphons

Q.—Our 4-6-6-4 type locomotives are equipped with three syphons and we are about to apply a new firebox to one of these locomotives. Should the syphons be applied to the fireboxes before or after the new firebox is applied to the boiler?—R.D.J.

A.—The general practice is to fabricate the firebox and apply same to the boiler without the syphons, applying all the staybolts to within one row of the outside syphon flange weld, for the reason that on locomotives with two or three syphons it is very difficult to drive the upper rows of staybolts, also the radial staybolts with the syphons in place.

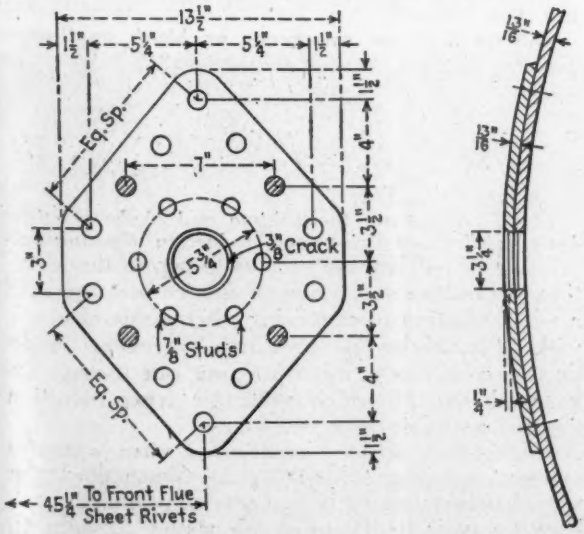
Studs in Boiler Shell

Q.—In changing the location of an air pump from the side of the boiler to the deck ahead of the smokebox, should the studs which held the air pump bracket be permitted to remain in the shell?—R.E.K.

A.—There is no objection to leaving the studs in the boiler shell providing same are not leaking. Studs found leaking should be removed, stud holes retapped and plugged from the outside of the shell; where the studs are not found to be leaking there would be no objection to cutting off the studs, allowing sufficient amount of the studs to protrude out of the sheet so that same can be riveted over.

Boiler-Check Patch

Q.—A crack has developed out of the boiler check hole on the right side of a switching locomotive. The check is secured to the boiler with studs and the boiler check hole is reinforced with a square liner on the inside. In making a patch to reinforce the crack in the boiler check hole can the liner on the inside of the shell be eliminated?—M.E.V.



Indicates 13/16" holes now in boiler to be reamed 1 1/16" for 1" rivets.

Indicates 1 1/16" holes for 1" rivets.

All steel rivets used.

Drill small hole at end of crack.

Diamond-shaped patch with liner omitted

A.—The drawing illustrates a typical check hole patch eliminating the original check hole liner. The patch should be designed so that the original rivet holes in the square liner are used for rivets in the diamond-shaped patch as shown. As a rule, this can be worked out without too much difficulty.

Crown Sheet Stays

Q.—In applying staybolts to the crown sheet of a locomotive boiler, do the staybolts have to be radial with the crown sheet, i.e. vertical to the sheet?—R.E.M.

A.—It is desirable that the staybolts be radial with the crown sheet on the curved portion of the sheet, with the staybolts standing vertical in the plate, so as to obtain the maximum number of staybolt threads engaging the plate. However, where the staybolts are not normal to the stayed surface, they should have not less than three engaging threads of which at least one shall be a full thread.

Steam Locomotive Practice

By George M. Davies

Which Is the Top?

Q.—What is considered the top leaf of a double-elliptic spring? Is the top of the spring determined by its position on the locomotive?—M.E.D.

A.—The top leaf of a double elliptical spring, when considering a defective spring, would be the long side of the spring. In the case of a double elliptical spring it would be the long side of either of two semi-elliptical springs which combine to make the double elliptic spring. Its position on the locomotive would not determine the top or bottom of the spring in this respect.

Distance Between Steps

Q.—What I.C.C. rule covers the maximum vertical distance between two sections of a runboard without providing a step? On our switching locomotives, one section of the runboard is over the air reservoir and is a considerable distance above the front section.—F.E.M.

A.—I do not know of any specific I.C.C. rule that covers this question. There are many locomotives operating where the vertical distance between the sections of the runboard will approximate 18 in. to 22 in.

The United States Safety Appliances for all classes of cars and locomotives provides for a maximum of 19 in. for the spacing of ladder treads and 21 in. as the maximum distance from the bottom tread of side ladder to top tread of sill step, indicating the maximums that have been established.

Sand-Box Design

Q.—Our Mallet locomotives are equipped with very shallow sand boxes due to a height limitation. It results in a wide sand box with insufficient slope to the sand outlets to make the box self-cleaning, leaving one-

third of the sand in the box that cannot be utilized. Are there sand-box designs that will overcome this difficulty?—M.I.T.

A.—On many large locomotives where the height limitation restricts the sand-box height auxiliary sand boxes are applied on the sides of the locomotives under the running boards. The sand boxes on the top of the boiler are piped to the auxiliary sand boxes and only that portion of the top sand box that is self-cleaning is utilized for sand, the remainder of the box being partitioned off.

Another means of cleaning out sand boxes that are not self-cleaning is to use sand spreaders. The sand spreaders consist of cast pipe sections drilled on opposite sides with small holes equally spaced, the pipe sections running the heighth of the sand box and located along the top line of the boiler. Air released from an operating valve in the cab disturbs and loosens the sand built up in a cone or V-shape in the center of the box and drives it to the outlets at the sides of the sand box. Sand spreaders can be purchased complete with valves for single or dual operation as desired.

Length of Radius Bar

Q.—In computing the length of the radius bar of a two wheel engine truck from the formula

$$R = \frac{A \times B}{A + B} \times .85$$

where:

A = ***distance from the truck to the farthest driver***
B = ***distance from the truck to the nearest driver***
R = ***length of radius bar***

In this formula is not the actual length of the radius bar equal to $\frac{A \times B}{A + B}$***? Please explain the reason for reducing the length of the radius bar to 85 per cent of the actual length of the radius bar required.—R. E. F.***

A.—On a two wheel truck where the radius bar is too long the outer wheel will run toward the outer rail while if the radius bar be too short the outer wheel runs away from the outer rail. The reason for reducing the length of the radius bar to 85 per cent of the required length is to give the outer truck wheel a tendency to run away from the outer rail thus assisting the truck in negotiating the curve.

Schedule 24RL Air Brakes

Q-830—How long is this connection maintained? A.—The release interlock slide valve is held in its upper position, maintaining connection through cavity *Z* as long as displacement reservoir pressure on the lower side of release interlock diaphragm exceeds 6 lb. approximately.

Q-831—As the auxiliary reservoir pressure becomes greater than brake pipe, what takes place? A.—The higher pressure acting on the auxiliary side of the service piston results in movement of the service piston and graduating valve toward service position, until stopped by engagement of the tail end of slide valve as shown in Plate D. This is graduated release lap position.

Q-832—What is taking place at this time? A.—Cavity *c* in the graduating valve connects slide valve ports *13* and *32*, thus venting the air from chamber *K* in the left side of the release piston through passage *13*, cavity *c* in the graduating valve, passage *32*, cavity *y*, in release interlock slide valve to the interlock slide valve to the interlock slide valve exhaust passage to atmosphere, *At*. Auxiliary reservoir pressure in chamber *D* then moves release piston and slide valve to the left, cutting off the cavity connecting displacement reservoir passage *3a* and exhaust passage *10*. This also blanks the emergency reservoir seat port *22* to the auxiliary reservoir.

Q-833—Is here any air being retained in the displacement reservoir? A.—Yes. With the release slide valve exhaust closed, the air remaining in the displacement reservoir is retained and can be released in successive steps.

Q-834—What does the amount of reduction in the displacement reservoir depend on? A.—The amount of air pressure that has been restored in the brake pipe, this condition existing until displacement reservoir pressure is reduced to approximately 6 lb., at which point the release interlock spring *142* moves the release interlock slide valve to the lower position.

First Service Position

Q-835—What is this position used for? A.—Long trains where excessive brake pipe leakage exists with which the brake pipe pressure is progressively lower from front to rear of train. This position causes a normal light initial reduction, then reduces the brake pipe at a slow controlled rate, and prevents an excessive difference in brake cylinder pressure between the front and rear. Sudden slack changes and shock are thus reduced.

Q-836—With an emergency or blank application portion, how are the port connections? A.—When the brake valve handle is placed in first service position, equalizing reservoir flows through pipe *5*, passage *4*, through a restricted port in the rotary valve to passage *24a* (through cock *42)* and passage *24* leading to the reduction limiting reservoir.

Q-837—What are the volume and choke relations between the equalizing and reduction limiting reservoirs? A.—They are such as to permit the reduction to continue at the normal service pressure until a 6-lb. reduction of equalizing reservoir is obtained, with *70* lb. brake pipe pressure. Thereafter the reduction continues at a much slower rate through exhaust choke *111* which vents air from reduction limiting reservoir passage *24*.

Q-838—How are the connections when a service application portion is used? A.—When the brake valve handle is placed in first service position, equalizing reservoir air flows through passage *5*, cavity *Q*, passage *4*, through a restricted port in the rotary valve to passage *24a*, (through cock 42) leading to the reduction limiting reservoir, reducing equalizing reservoir about 6 lb. Thereafter the reduction continues at a much slower rate through exhaust choke *N* (located in the application slide valve *114)*, which vents air from reduction limiting reservoir passage *24*.

CAR INSPECTION AND REPAIR

Finishing Roller-Bearing Axles for Passenger Cars

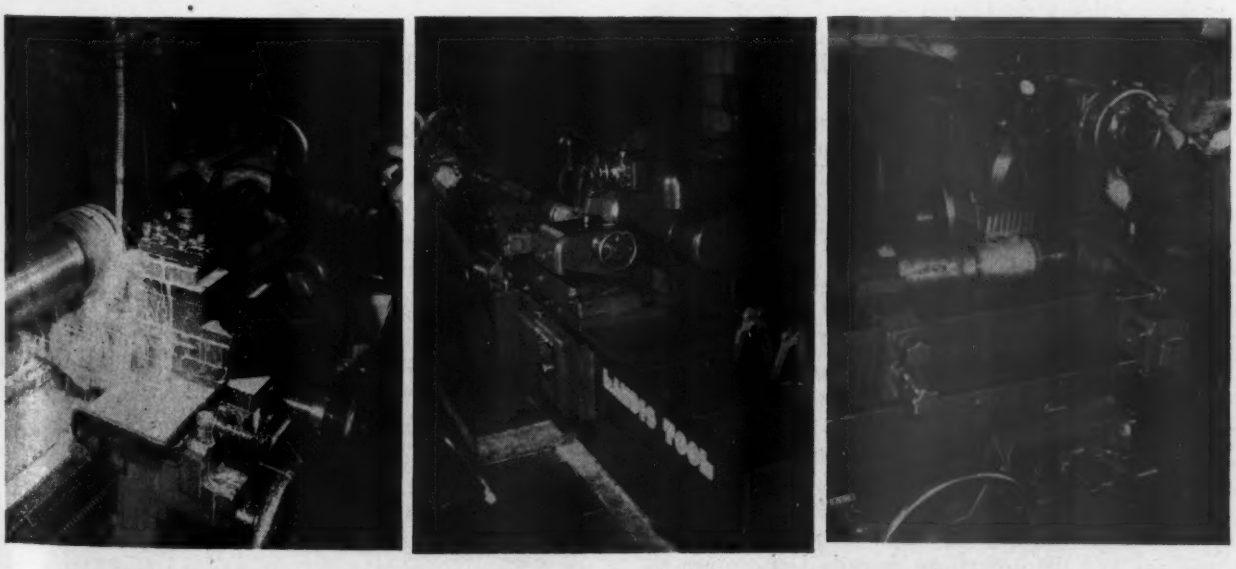
Axles for mounting roller bearings under passenger cars are finished to a tolerance of .001 in. on a two-machine layout at the New York Central's West Albany shops. A 20-in. American Pacemaker hydraulic duplicating lathe contour finishes the rough-turned axle to .015 in. oversize, and a Landis grinder finish grinds the bearing seat and bearing radius, and the dust guard seat and its radius to finished dimensions within .001-in. tolerance. Axle sizes on which this arrangement is being used are the 5½-in.-by-10-in. and the 6-in.-by-11-in. standard AAR roller bearing axles.

The complete cycle begins with moving the axles four at a time on a fork-lift truck from the outside storage rack to the shop-interior rack. Handling the axles to the lathe and from the lathe to the grinder is done with an overhead mobile boom with a one-ton air hoist. The boom is actuated by trolleys moving on tracks above the area of the axle storage rack, the duplicating lathe, the grinder and an engine lathe located at the end of the duplicating lathe opposite the grinder. The air hoist is suspended from a trolley on the boom to permit the required lateral movement.

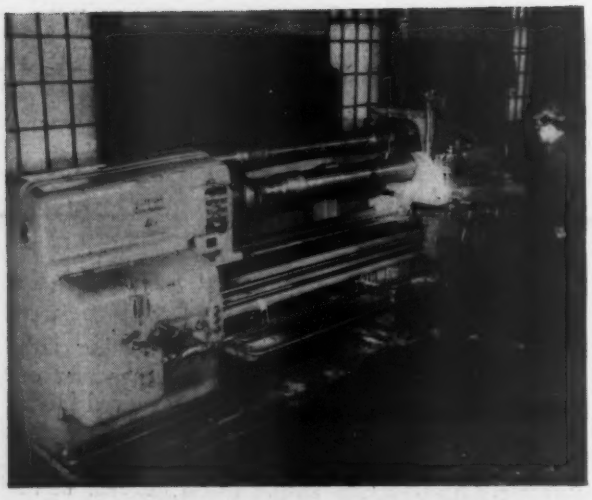
The duplicating lathe has a template or a standard accurately finished axle suspended at the rear of the machine on an adjustable rack to determine the contours of the axle to be machined. After the axle has been mounted in the lathe, the carbide-tipped cutting tool is aligned on the axle with the hydraulically-operated follower or stylus contacting the template.

A cut is begun on the end collar to determine the basic diameter and the follower is set to turn the axle .015 in. above the blueprint dimension to allow for the grinding of those surfaces requiring grinding. At a speed of 203 r.p.m. and a feed of .007 in., about ⅛ in. of metal is removed from the rough-turned axle except at the radii where, normally, a greater amount must be removed.

In the first setting in the machine a continuous cut is taken from the beginning of the end of axle and continuing across the axle to the end of the wheel seat on the opposite side of the axle. This permits the tool to feed into the small fillets between the collar and the bearing, between the bearing and



Left: The first step in contour machining the roller bearing axle on the duplicating lathe finishes it from the end of the axle, contouring across the axle to the end of the opposite wheel seat—In the next step the axle is turned end for end, the tool aligned with the follower and a continuous surface generated from the unfinished end to where the first cut was stopped—Center: The bearing seats and radii are finished machined within a .001-in. tolerance on this grinder—Right: The dual grinding wheel has a 1½-in. radius on the left wheel with a ⅜-in. relief on the spacer side—The second wheel has a 1-in. radius on the right side



The hydraulic duplicating lathe automatically machines a roller-bearing axle to template dimensions. An accurately finished axle located at the rear of the lathe out of operator's line of vision is the template

the dust guard seat, and between the dust guard seat and the wheel seat. The axle is then turned end for end and the tool is again lined up with the follower and the opposite journal and wheel seat are finished by continuous-contour cutting to the point on the axle established by the first cut. Standard cemented carbide-tip tools are used without a chip breaker for the above operation. Coolant, although not absolutely necessary, is used to give increased speed without loss of accuracy by minimizing the temperature rise of the axle and the cutting tool.

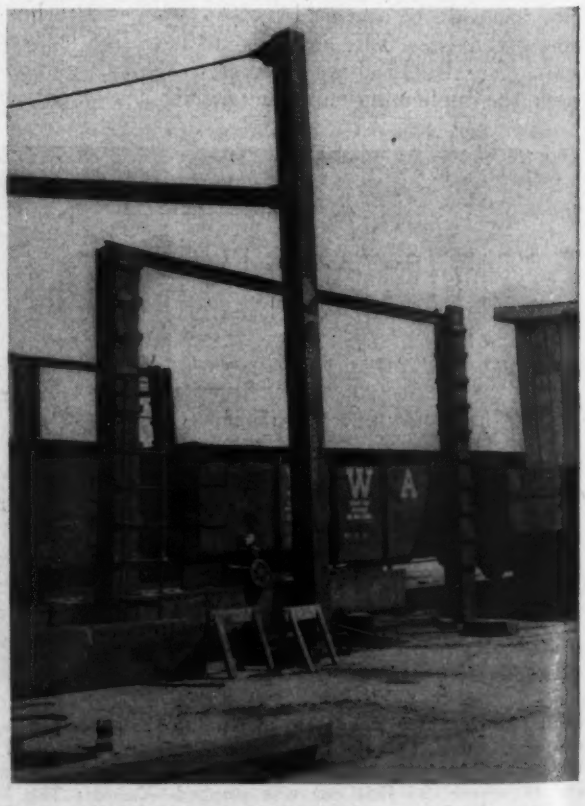
Upon completion of the machining operation, the axle is transferred to the grinding machine by the mobile boom, and lined up for grinding. This is performed by a dual grinding-wheel assembly consisting of one wheel 5⅜ in. by 30 in. by 12 in., the other 2½ in. by 30 in. by 12 in. with a ⅛-in. spacer between wheels. The 5⅜-in. wheel has a 1½-in. radius on the left side and a ⅜-in. relief on the spacer side. The 2½-in. wheel has a 1-in. radius on the right side. The axle journal radius is lined up with the 1½-in. radius of the 5⅜-in. wheel and that portion of the journal is plunge ground to .002 in. of finished size. The portion of the journal-bearing seat not ground by this operation is then lined up with the relieved side of the wheel and plunge ground to same diameter. The 1½-in. radii are lined up again and the journal is traversed away from the wheel, grinding the complete journal and radius to the finish size. The opposite end of the axle is traversed toward the grinding wheel and the radii on the grinding wheel and dust guard seat are aligned and plunge ground to finish size. This operation completed, the axle is reversed in the machine and the operations described above are repeated on the opposite journal and wheel seat. The tolerance is plus .001 in. and minus .000 in.

Some axles passing through the shop are bored out on one end to receive a spline bushing for a Decelostat. Where this is done, the axle is transferred by the mobile boom to the engine lathe at the end of the duplicating lathe and mounted with the round surface of the dust guard on a steady rest for accuracy in boring and to avoid marring the journal. The opening is bored out with a ¾-in. pilot drill, enlarged with a $1\frac{15}{16}$-in. drill, and cleaned up to size with a boring tool. The spline is then tapped in with a sledge, using a protective fitting to protect the spline while it is being driven in.

Straightening Loads Shifted en Route

Scrap freight car center sills may be put to effective use along the rip track for aligning car loads which have shifted either lengthways or crossways in transit. By means of an arrangement constructed of six permanently installed and several movable center sills, shifted heavy lading is rearranged normally in less than one hour. The arrangement not only makes the realigning faster and safer, but it eliminates having to tie up such heavy equipment as the steam crane for the task. It is also used to cold-straighten car ends and sides that have become bulged out.

The fixed portion of the straightening arrangement comprises a jib crane and six center sills sunk six feet into the ground in five square feet of concrete. Three of the sills are set on each side of the track.



Arrangements for correcting loads that have shifted in transit

Each is 8 ft. from the rails and 10 ft. from the next sill. The three sills on each side are joined together by a 6-in. I-beam. The two end sills on each side and the middle sill on one side extend about 15 ft. above the ground level. The middle sill on the other side is about 10 ft. higher to accommodate a jib crane with a 3-ton hand chain hoist. The hoist runs on a 10-in. I-beam swing-mounted to the sill.

When a load has shifted sideways, one of the movable center sills is placed across the track sides of three of the fixed vertical sills. The movable sill rests on three bars, 1 in. by 2 in., which fit into slots with the 2-in. dimension vertical. The slots are made by welding the open side of channel sections 3 in. by 1¼ in. by ¼ in. to the upright sills every 15 inches beginning 30 inches above the ground. The movable sill is secured in place by safety chains. A 50-ton air jack suspended from the 3-ton hand chain hoist and backed up by the movable sill shifts the load to where it belongs.

The same procedure is followed if a car side has been bulged out to the extent that it requires straightening, except that the movable center sill is located at a lower height so that the jack contacts the side of the car rather than the load above the top of the sides.

Loads which have shifted lengthwise are straightened by suspending a movable center sill from the crane; one end of the sill is maneuvered into position against the one or more pieces of the load that may have shifted, and the opposite end is pushed by means of a switching locomotive to shift the load to its proper position.

When car ends require straightening one of the movable sills is laid across a pair of the end upright sills to span the card end. This sill is held in place the same way that a sill is held parallel to the track. The air-jack is raised to position, and a piece of half-round steel about 18 in. long is inserted between the end and the jack shaft with the round side between a pair of corrugations and the flat side against the end of the shaft.

A power car mover is installed at one side of the track to eliminate the need for a switcher for all side or end straightening and for all load shifting except loads that have shifted lengthwise.

Straightening Top Bulb Angles Cold

A device has been built at the Decatur, Ill., car shop of the Wabash for the cold straightening of gondola or hopper car top bulb angles which have been bent downward. The device is hung over the side of the car, straddling the bent portion of the bulb angle. An ordinary jack is used in conjunction with it to apply the necessary force to straighten the angle.

The overall height of the straightener is 5½ ft. and the width 4 ft. The sides are made from angle's 4 in. by 3 in. by ½ in. The bottom has two angles of this size welded together, with a ½-in. filler plate between the vertical flanges for added stiffness. A channel section 3 in. by 1¼ in. by ¼ in. is welded between the sides 16 in. above the bottom.

Two lengths of strap iron 2 in. by ¼ in. are welded 17 in. above the top of the channel section. A U-shaped member made from 2 in. by ¼ in. plate with bolts welded to each leg is held with the open end next to the strap irons by bolts fitting through the strap iron. This section holds the 4 by 4 which fits on

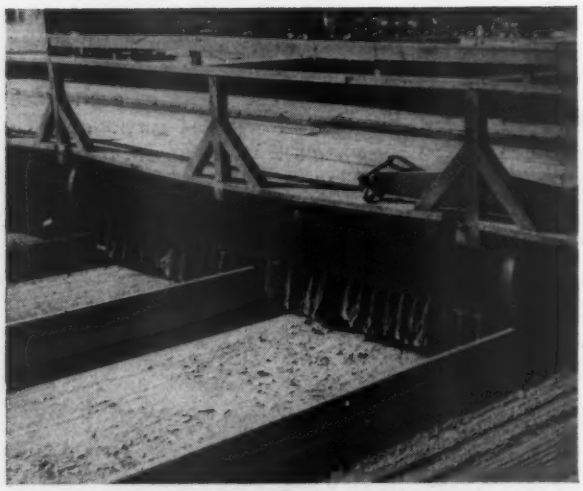
Device which permits cold straightening of top bulb angles

top of the jack and transmits the force to the top bulb angles. The top of the 4 by 4 is protected by a Z-shaped piece of plate about 8 in. long which fits between the bottom of the bulb angle and the top of the 4 by 4.

The straightener hangs on top of the bulb angle by two 6 in. lengths of 1 in. plateing. This 1-in. thickness is carried down about 10 in. below the car top to give added stiffness to each side of the straightener.

Sweeper For Transfer Table Pit

In order to keep transfer table pits clean, the device shown was developed at the Bayshore, Calif., shops



Brush made from pieces of wire cable, with ends frayed, keeps transfer table pit in an orderly condition

of the Southern Pacific. It consists of short lengths of 1-in. scrap wire cable attached to a cross member on the table by ⅜-in. U-bolts. By allowing the frayed ends of cable to scrape the ground between the rails when the transfer table is moved back and forth, the pit is kept clean. It is not feasible to give dimensions for this device as the design has to be modified to suit existing conditions. The cable ends are spaced 5 to 6 in. apart and, in snow country, provision probably should be made for the removal of the brushes as complete units during winter months.

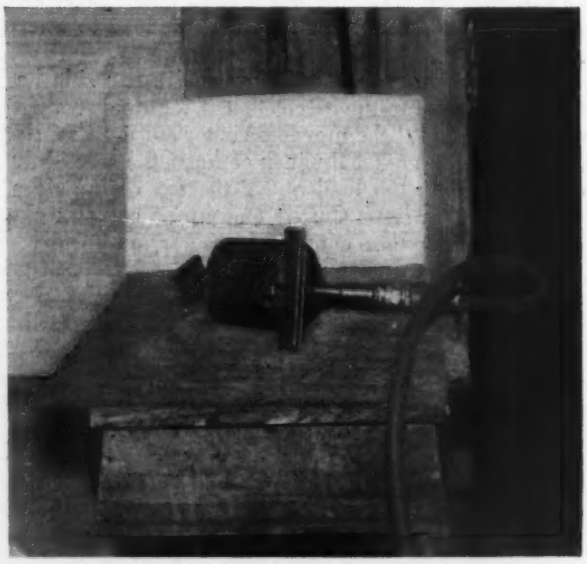
Jack for Tightening End Boards in Place

End lining boards are fitted tightly together at the Illinois Central Centralia, Ill., car shops with the aid of a small air-operated jack. When all the tongue and groove boards except the last two on one side of the end of the car have been set in place, the jack is inserted half way between the floor and the roof with the face plate of the piston rod against the car side and with a grooved extention fitting against the last board in place. Air admitted to the cylinder squeezes the boards tightly together, causing the end boards in the center area to bow out.

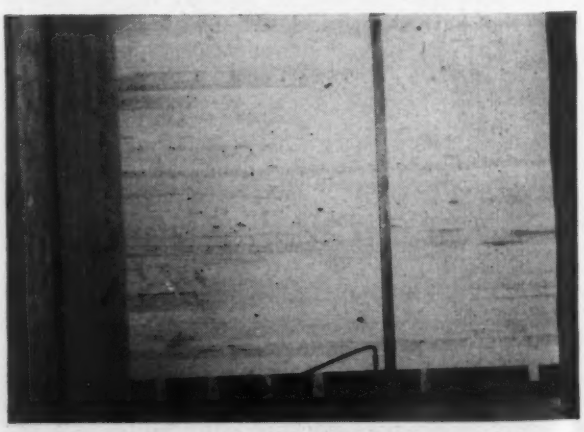
The end lining boards are restrained from being forced out of place or bowed out too far by a temporary board installed across the end of the car just above the jack. The temporary board is held in place by a length of ¼-in. strap iron bent to an L-shape and welded to a second length of strap iron 2 in. by 7 in. by ¼ in. which is nailed to the side lining board through six nail holes. The temporary board is 4 in. by 4 in., and from it has been removed a section 1 in. deep extending across the width of the board. This section cut out of the entire board to within the last foot of each side, permits the end lining boards to buck out the desired amount.

After the lining boards have been bowed out an amount found by experience to be within desirable limits, holding nails are driven in several boards and the jack removed. The last two boards, which includes the straight-edge end board that has been cut to fitting size, are then applied. The job is completed by pushing in on and driving with a sledge the bowed-out section, thereby attaining a snug and tight fit between the boards comprising the end lining.

The jack has a cylinder 4-in. diameter and 3-in. stroke. To the head of the cylinder is welded a 6-in. length of strap iron, into which a groove has been cut sufficiently large to fit around the tongue of the lining board without damaging the tongue during the bucking-out operation.



The jack used for tightening end lining boards in place—On the left is the pressing end which fits against the car side—On the right is the grooved member which fts over the tongue of the lining board



The end-board tightening jack in place ready for the squeezing and bucking-out operation—Just above the jack is the temporary board which restrains the lining boards from being forced out of place—On the side of the temporary board, not visible, a groove 1 in. deep has been cut to within a foot of the end on each side.

ELECTRICAL SECTION

A.A.R. Electrical Sections to Meet in Chicago

September 19-22

Electrical Section, Mechanical Division Association of American Railroads

MONDAY, SEPTEMBER 19

10:30 a.m.—Joint meeting of the Coordinated Associations, Grand Ball Room, Mezzanine Floor, Hotel Sherman.
Address—
Speaker and subject to be announced.

2:00 p.m.—Committee of Direction meeting, Hotel LaSalle.

TUESDAY, SEPTEMBER 20

9:00 a.m.—Hotel LaSalle, Address by L. S. Billau, *(chairman)*, electrical engineer, Baltimore & Ohio.

9:20 a.m.—Welding and Cutting—L. E. Grant, *(chairman)*, engineer of tests, Chicago, Milwaukee, St. Paul & Pacific.

10:20 a.m.—Motors and Control (Diesel facilities)—R. H. Herman, *(chairman)*, engineer of shops and equipment, Southern.

11:00 a.m.—Locomotive and Electrical Equipment—A. D. Whamond, *(chairman)*, foreman, office of electrical engineer, Pennsylvania.

11:30 a.m.—Application of Radio and Communication Systems to Rolling Stock—W. S. Heath, *(chairman)*, assistant electrical foreman, Atchison, Topeka & Santa Fe.
Adjournment to Allied Railway Supply Association Exhibits, Mezzanine Floor, Hotel Sherman.

WEDNESDAY, SEPTEMBER 21

9:00 a.m.—Hotel LaSalle—Car Electrical Equipment—S. B. Pennell, *(chairman)*, assistant engineer, New York Central.

10:30 a.m.—Car Air Conditioning Equipment—K. T. Benninger, *(chairman)*, general electrical supervisor, Chicago & Eastern Illinois.

2:00 p.m.—Hotel Sherman—Automotive and Electric Rolling Stock (Diesel)—R. I. Fort, *(chairman)*, assistant research engineer, Illinois Central.
Joint meeting with Locomotive Maintenance Officers Association, Grand Ballroom, Mezzanine Floor.

Electrical Section, Engineering Division Association of American Railroads

THURSDAY, SEPTEMBER 22

10:00 a.m.—Hotel LaSalle—Address of welcome by L. S. Werthmuller, *chairman*, Signal Section, A.A.R., and *first vice chairman*, Engineering Division, A.A.R.
Address by S. R. Negley, *(chairman*, Electrical Section), electrical engineer, Reading Company.
Address—
Speaker and subject to be announced.
The Committees which will present reports are as follows:
1—Power Supply
3—Overhead Transmission Line and Catenary Construction
4—Wire, Low Voltage Cable and Insulating Materials
5—Electric Heating and Welding
6—Application of Motors
7—Clearances for Third Rail and Overhead Working Conductors
9—Track and Third Rail Bonds
10—Illumination
13—Application of Corrosion-Resisting Materials to Railway Electrical Construction

A Diesel locomotive generator goes into a vapor degreaser for cleaning — Condensation of the hot vapor on the relatively cool armature applies the cleaner to all surfaces

Cleaning Diesel Motors and Generators

The do's and don't's of the several ways of cleaning now used in railroad repair shops

By P. E. Demmler and Graham Lee Moses†*

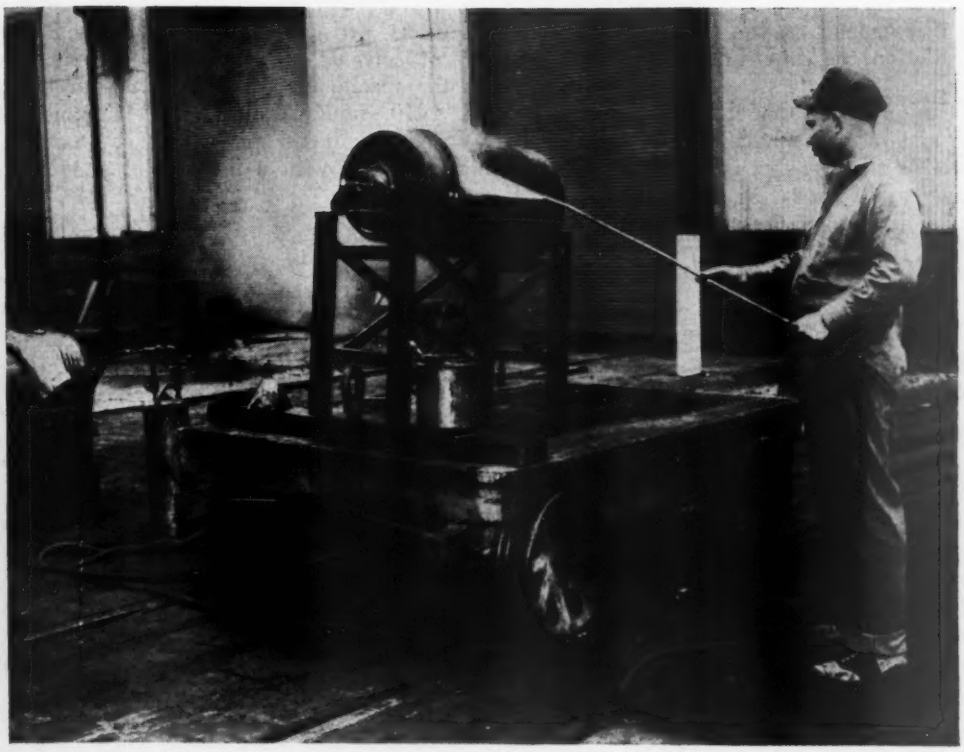
CLEANING problems have always existed on electrically propelled locomotives. Diesel locomotives present special cleaning problems because of the presence of fuel oil in combination with dust which may contaminate insulation creepage surfaces and plug vent ducts. The electrical transmission of a Diesel locomotive is a very important part and must be kept in operating condition with a satisfactory level of reliability. The insulation of the electric machinery constituting the power transmission system is one of its most important parts. Although the actual operating voltages are moderate in value, and the circuits are usually ungrounded, it is necessary to maintain clean insulation creepage surfaces or serious insulation trouble may occur.

* Manager of the Insulation Development Section, Materials Engineering Department, Westinghouse Electric Corporation.
† Manager of the Development Insulation Section, Transportation and Generator Engineering Department, Westinghouse Electric Corporation.

Since many of the operators of Diesel locomotives are primarily mechanically minded, it may be desirable to summarize the electrical engineer's thinking concerning insulation problems associated with dirt and its removal from electric insulation.

1—Materials commonly used as electric insulation are non-conductors only when clean and dry, hence proper maintenance is essential.

2—Operating instructions provided by all manufacturers on every kind of electrical equipment emphasize the importance of keeping electric apparatus clean and dry.



The usual method of cleaning armatures with vapor solvents consists of manually applying a spray by means of compressed air

3—When electric apparatus does get dirty, the insulation must be cleaned. Various methods for cleaning are available, and the method used will depend on the kind of dirt to be removed and on whether the apparatus is to be returned to use immediately or whether coils are to be removed and the apparatus rewound with new coils. *The cleaning method employed must not damage the basic insulation.*

4—Drying after cleaning is necessary.

5—Revarnishing after cleaning is desirable to restore surface protective films.

6—Testing is desirable and necessary after cleaning and drying to determine whether the insulation has been properly reconditioned.

Basic Concepts for Cleaning Electric Apparatus

Electric apparatus should be kept reasonably free from accumulations of dirt so that ventilating ducts may function, and so that low resistance paths may not be formed between live parts.

Cleaning may be by wiping, blowing by compressed air, or removing dirt by suction.

If a solvent is necessary to remove oil or grease, it is recommended that a petroleum solvent of the safety type be used exclusively.

Insulating varnishes, unless well cured, are attacked by solvents.

Petroleum solvents are less likely to attack the varnishes than stronger solvents, such as chlorinated solvents or coal tar solvents.

Synthetic varnish films are more resistant to solvents than oleo-resinous varnish films, but they may be softened or lifted by strong solvents especially if not fully cured.

Solvents should not be used for cleaning silicone varnish-treated windings. (See special instructions at the end of this article.)

CAUTIONS:—

Adequate ventilation must be available to avoid fire, explosion and health hazards where solvents are used.

Avoid breathing solvent vapors. Vapors of chlorinated solvents are especially toxic.

When working with solvents in confined spaces where ventilation is poor, as in tanks or pits, suitable protective masks must be worn.

Petroleum distillates, coal tar solvents, alcohol, and many other materials, are flammable and their vapors may form explosive mixtures with air.

Keep open flames and sparks away from flammable liquids and their vapors.

A metal nozzle on a hose used for spraying flammable solvents should be grounded.

Personal protective equipment, such as goggles, gloves, and aprons should be provided when working with solvents to prevent irritation due to continuous contact or splashes.

Avoid wetting clothing with solvent. If clothing becomes saturated with solvent, it should be changed.

Goggles should be worn when blowing out dust with compressed air.

Cleaning Method Details and Selection

The recommended methods of cleaning electrical insulation include:

a—Wiping off the dirt with a clean, dry cloth
b—Blowing out the dirt with compressed air
c—Drawing off the dirt by suction
d—Removing the dirt with solvents
e—Washing off with water

The method selected will depend on the type of apparatus, the type of insulation, the kind of dirt, and other conditions involved.

A—*Wiping cloths:* Cleaning with a dry cloth may be satisfactory when the apparatus is small, the surfaces to be cleaned accessible and dry dirt only is to be removed. *Waste should not be used,* as lint will adhere to the insulation and increase the collecting of dirt, moisture, and oil. This is particularly objectionable on high voltage insulation as it tends to cause concentration of corona.

B—*Compressed air:* Blowing out dirt with a jet of air is usually effective, particularly when the dirt has collected in places which cannot be reached with a cloth. Cleaning can be done more quickly with compressed air than with a cloth especially on large apparatus. It should be noted that if blowing with compressed air simply transfers dirt from one place to another machine, little or no good has been accomplished. The following conditions should be emphasized:

1—Do not blow the compressed air against insulation until it is certain that the air is dry and does not carry water which may have condensed and accumulated in the air line.

2—Do not use air pressures greater than 50 lb. per sq. in. Too high a pressure may damage insulation and blow dirt under loosened tape.

3—Do not direct the stream of compressed air in such a way that the dirt will be blown into some inner recess from which it would be difficult to remove the dirt, and where it might close ventilating ducts.

CAUTIONS:—

Wear goggles when blowing out dust with compressed air. Be careful so as not to direct the jet of air against a person with resultant injury.

C—*Vacuum:* The well-known vacuum cleaner principle in which dirt is sucked up and collected in a bag, can be applied to the cleaning of electrical insulation. It is an effective and desirable method of removing dry and loose dirt, since it does not scatter the dirt and thereby avoids settling of the dust on other apparatus.

D—*Solvents:* If the accumulated dirt contains oil or grease, a solvent is usually required to remove it. A rag wet with solvent may be used for wiping, the solvent may be sprayed on or the apparatus may be dipped in the solvent. Vapor degreasers which have come into use within the last few years for cleaning apparatus will be discussed in a later section.

Solvent Selection

Solvents for cleaning may be divided into several groups: (1) petroleum distillates; (2) other solvents; including chlorinated solvents, mixtures of chlorinated and petroleum solvents, aromatic, or coal tar solvents; and (3) water.

1—*Petroleum Distillates:* It is recommended that only this type of solvent be used where a solvent is required for cleaning electrical apparatus.

Petroleum distillates which are classed as "safety type solvents" and have a flash point above 100 deg. F. (37.8 deg. C.) are supplied by practically all oil companies under various trade names. Included in this group of solvents are: Stoddard solvent (described in the specifications of the U.S. Bureau of Standards, 1940, under the title of "Commercial Standard CS3-40); mineral spirits, cleaner's naphtha, and similar products with a flash point above 100 deg. F.

CAUTIONS:—

a—These solvents are all flammable and their vapors form explosive mixtures with air if used at temperatures above the flash point. Since this flash point of the solvents mentioned above is higher than that of certain other petroleum distillates, such as gasoline, the safety type solvents present a lesser fire hazard.

b—For safety sake, the fire insurance companies' regulations should be followed. These regulations state that the concentration of accumulated flammable vapors should not exceed 25 per cent of the lower explosive limit. For petroleum solvents, 25 per cent of the lower explosive limit amounts to $^{25}/_{100}$ to $^{30}/_{100}$ of 1 per cent by volume of vapor in air. Ample precautions must be taken to prevent fires and explosions.

c—Air containing considerable amounts of vapors of these solvents will have toxic effects when inhaled. The ventilation in shop areas is usually sufficient to avoid harmful accumulations of vapor but when solvent is used on warm apparatus or in hot locations, the evaporation rate will be higher and more attention will have to be paid to providing proper ventilation. In confined spaces also, the need for ventilation must be considered.

d—Excessive contact of the solvents with the skin should be avoided. Neoprene gloves and aprons can be used to provide protection against skin contact.

e—Gasoline, V.M. & P. naphtha and similar grades must not be used for cleaning except in closed systems, because they are more volatile than the recommended grades and, therefore, present a greater fire hazard.

f—A few cleaning fluids marketed under the general name of "Safety Solvents" contain appreciable quantities of carbon tetrachloride to reduce their flammability. This type of solvent should be avoided on account of the toxicity of carbon tetrachloride.

2—*Other Solvents:* There may be cases where a low power petroleum solvent will not provide proper cleaning and a stronger solvent, therefore, becomes necessary. Where a special cleaning job of this kind occurs, it should be performed only under expertly controlled conditions. Among the strong solvents which might be considered in cases of this kind are:

a—Chlorinated solvents, such as carbon tetrachloride, trichlorethylene, and perchlorethylene;

b—Mixtures of chlorinated solvents and petroleum solvents;

c—Coal tar solvents, such as benzol, toluol, xylol, or products containing these materials.

In the past, carbon tetrachloride, and mixtures of carbon tetrachloride with petroleum distillates, have been used extensively for cleaning, principally because of the high solvent power and non-flammable characteristics of these materials. However, the un-

controlled use of carbon tetrachloride, alone or in mixtures, is now looked upon as extremely dangerous and many companies have restricted or forbidden its use. This is due to the well-known toxic effect of carbon tetrachloride on all persons exposed for periods of time to air containing amounts of these vapors in excess of the "maximum allowable concentration." This may be defined as the maximum amount of vapor of a solvent in air which can be breathed eight hours per day without danger of poisoning. The effect of breathing carbon tetrachloride vapors may be fatal in case a person is exposed to even moderately high vapor concentrations. It is, therefore, recommended that the use of carbon tetrachloride, alone or in mixtures, for cleaning purposes, be avoided.

Trichlorethylene and perchlorethylene are two other commercially available chlorinated solvents which are being used by the industries for cleaning purposes. The cost of these compounds is higher but the toxic effects are much less than for carbon tetrachloride. The maximum allowable concentration of the three solvents as listed in various state industrial hygiene codes is within the following ranges:

Carbon tetrachloride .... 35 to 100 parts per million parts of air

Trichlorethylene .....100 to 200 parts per million parts of air

Perchlorethylene (also known as tetrachlorethylene .....100 to 200 parts per million parts of air

Perchlorethylene has a lower vaporization rate than either of the other compounds and is, therefore, less likely to produce as high a vapor concentration under similar conditions.

Trichlorethylene and perchlorethylene are the solvents generally used in vapor degreasers, in which the solvent is boiled at the bottom of the tank, around the top of which cooling coils are placed to condense the solvent vapors and prevent them from flowing out over the upper edge of the tank. Articles to be cleaned are lowered into the hot solvent vapors which condense on the cold surfaces and wash down soluble materials. Solvent is not lost if the system is operating properly except for a small amount which is carried along when cleaned material is removed from the tank. The hot solvent vapors may strongly attack varnish films, frequently softening and lifting them so that the cleaning of varnished apparatus in a degreaser is not advisable unless there is no objection to the possible removal of the varnish. Vapor degreasers, in which chlorinated solvents must be used, are not recommended on insulation that is to be re-used. They may be used on metal parts where insulation is not present or on parts containing insulation that is to be scrapped. It is highly questionable if subsequent re-varnishing can repair varnish films or internal treatments that have been damaged by the high solvent power of chlorinated solvents.

Since chlorinated solvents are likely to soften and lift varnish surface films and even penetrate coil interstices, serious consideration should be given to the effect of these solvents before using them for cleaning electrical insulation. If a solvent of this kind is necessary, perchlorethylene is recommended because it is less likely to produce hazardous conditions than the other solvents of this type.

When trichlorethylene and perchlorethylene are used, definite precautions must be taken to prevent breathing air containing excessive concentrations of their vapors. Proper ventilation of the space should always be assured and, in cases where adequate ventilation cannot be provided, either chemical cartridge respirators or suitable gas masks must be used.

Contact of these solvents with the skin should be avoided. Neoprene gloves and aprons will give protection but they tend to swell in these solvents. For most jobs this may not be objectionable, but for continuous exposure, a better type of glove should be used. Polyvinyl alcohol resins withstand the action of chlorinated solvents very well. Aprons and gloves made of "Resistoflex," a Polyvinyl alcohol type material, will give good service and protection against these solvents provided they do not contact water or aqueous solutions. The "Resistoflex" materials are slowly soluble in water and cannot be used where they may come in contact with it. Where these gloves soften due to sweating, use a pair of pall bearer's gloves inside the resin gloves. Where there is danger of cutting the protective gloves, use a canvas glove over the resin glove.

Protective skin creams may be of some value in preventing dermatitis from chlorinated solvents where the exposure is not too great and these creams may be used in cases where better methods of protection cannot be applied.

Mixture of Chlorinated Solvents and Petroleum Solvents

A mixture of a petroleum distillate like Stoddard solvent with a chlorinated solvent will provide a high solvency cleaner at a cost lower than that of the chlorinated solvent itself.

A mixture of trichlorethylene or perchlorethylene with a flammable liquid such as Stoddard solvent, presents a reduced fire hazard, and the hazard may be practically eliminated if a sufficient percentage of chlorinated solvent is added. However, it is best to handle these mixtures like flammable liquids, since it is difficult to determine whether adequate protection is maintained at all times.

Coal Tar Solvents: Benzol, toluol, and xylol are strong solvents, but they are flammable and toxic, and the use of these materials for cleaning purposes should be avoided.

During the last few years, solvents containing aromatic compounds, such as benzol, toluol, and xylol, have been prepared from petroleum. These solvents have the same toxic properties as similar products obtained from coal tar and their use for cleaning purposes should be avoided.

Water: Electrical apparatus which has been clogged with mud and other foreign matter by plant operations, dust storms, floods, or other unusual conditions, will require a thorough washing out. The apparatus may be washed off with water from a hose and should be disassembled so that all parts can be

(*Continued on page 523*)

The hoist lifts the coils out easily without the need of driving the wedges

Hoist and Come-Along For Removing Armature Coils

The usual procedure for removing coils when stripping a Diesel-electric traction motor armature includes several time-consuming operations. The armature is first placed in a lathe and the coils are cut through in three places—just back of the commutator risers and at each end of the coil slots. The coil ends at the pinion end can then be driven off and the ring of coil ends between the commutator and the slots can be split and removed.

This leaves the sections of coils in the commutator slots. The next operation consists of driving out the wedges, after which the coils are removed with a wedge or drift driven into the ends of the slots by a hand or air hammer. Almost always this procedure results in some damage to the laminations with resulting burrs which must later be removed.

The method of coil removal shown in the illustration is in use at the Pegram Shops of the Southern at Atlanta, Ga. In preparation for this kind of coil removal, only two cuts through the coils are made on the lathe,—one close to the commutator risers and another at the pinion end of the coil slots.

The armature is then placed horizontally on a stand as shown, and one of the coil ends is bent upward from the riser to which it was connected. It is not necessary to secure the armature to the winding stand as the weight of the armature alone is enough to cause the slot wedges to break when the coil is "lifted" out with the hoist.

A lineman's "come-along", suspended from an electric hoist, is used to grip the coil end, after which the hoist "lifts" the coil from the slot. With all the wedges now generally in service, it is not necessary to drive them out before pulling the coils. No damage is done to the slots and a full set of coils can be removed in less than an hour. The pinion-end coil ends are knocked off as a ring in the usual manner.

No damage is incurred to the slots by this method of coil removal

CONSULTING DEPARTMENT

Proper Application of Solderless Terminals Can Be Assured

How Can I Be Sure My Solderless Terminals and Connectors Are Put on Right?

Keep the Wire Clean

The only sure way to have good electrical connections with solderless terminals and connectors is to have habitually careful workers handling the work. While the terminals and connectors require no special skill on the part of the man doing the actual mechanical work of installation, that man must be as careful in the preparation of the wire termination as he must be to make a good soldered joint.

When removing the insulation from a wire end, care must be used to insure not nicking the strand or strands of wire. As with soldered joints, nicked strands are subject to breakage from vibration, bending, or tensile stresses.

The bare termination must then be cleaned as carefully as if it were to be tinned for a soldered connection. Then the pressure tool crimping the solderless connector on the wire can cause the strand or strands of copper to deform properly and make the good electrical and mechanical connection the solderless terminals and connections are noted for. It is especially true with hand crimping tools that residual insulation fragments and insulating oxides prevent good electrical contact though they permit firm mechanical connections.

One can but repeat—Keep the wire clean.

S. GUY FORBES
General Electric Company

Proper Installation Leaves Visible Evidence

Any and all solderless connections worthy of merit are pressure connections. The electrical joint is made with the use of some mechanical device which will exert pressure and maintain pressure on the electrical conductor. In just about every case the solderless terminals on small wires give visual evidence of installation procedure; that is, they are installed with tools which are designed, manufactured, and recommended by the manufacturer of the solderless devices.

The installed connection gives real visual evidence of proper installation. This is true to a considerable extent in the case of larger cables and larger terminations. Some pressure type connectors are made up with standard wrenches or with the Allen type wrench and generally will show visible evidence of tight and proper compression. There are other types on the market in which the cable receiving barrel of the connector is deformed in one way or another in bringing about compression, so that it again gives visual evidence of proper installation.

F. A. LEACH
Thomas & Betts Co., Inc.

Can you answer the following question? Answers should be addressed: Electrical Editor, Railway Mechanical Engineer, 30 Church Street, New York 7.

Does changing the gear-ratio or wheel diameter have any effect on the speed-tractive-force curve of a Diesel-electric locomotive?

Observe the Six Cardinal Rules

Solderless connectors and terminals as used in railroad service, both as original equipment and for maintenance and repair purposes, have well established their usefulness from the standpoint of economy, time-saving and convenience. Of course, as with any other method of making electrical terminations or connections, there are difficulties which can occur. Therefore, the shop foreman, supervisor or electrician may justifiably ask himself the question "How can I be certain that these solderless terminations or connections which I have made are both electrically and mechanically sound?" The solderless method of wiring is not entirely fool-proof but many things have been provided and are available to help make it so. Vast experience in this field has provided several simple rules and conditions which, if adhered to, will leave one with the satisfied feeling of a job well done.

Violation of some of the cardinal rules of solderless terminal application is just as serious as violation of the rules for good soldering: For example, failure to use properly tinned parts in soldering, or failure to use a soldering flux, results in a poorly soldered joint. Equally serious is the movement of parts being soldered just prior to the cooling or setting of the solder. However, due to the long years of acceptance for soldering operations, these rules are well recognized and closely watched.

Solderless terminal application, on the other hand, being a relatively new method, may not command the same degree of respect for the operating rules governing their application. As is often the case, there is a tendency to shrug off the responsibility for ob-

servance of good practice with the attitude, "It is only necessary to put these terminals in a tool and squeeze them."

Excellent performance and complete assurance of high quality wiring connections are readily available by the observance of the following six rules:

1. Be certain of the gauge or size of wire in use and select a terminal or connector designed for and recommended by the manufacturer for that size of wire.
2. Exercise reasonable care in the preparation of the wire before applying the terminal.
3. Use only the specific tool designated by the manufacturer for that type and size of terminal.
4. Find out how the installation tool should be used and then use it that way.
5. Inspect your work.
6. Be careful of installation tools.

Viewed collectively the adherence to the above rules might seem to be a complicated matter. Taking each as an individual case, however, and exercising these rules as a matter of course presents no difficulty whatsoever. A few words of explanation for each case will illustrate how this can be done.

Rule 1—Terminal Selection With Regard to Wire Gauge. In using soldered terminals the operator can often escape the consequences of a wrong selection in terminal size because additional solder may be run into the joint making up for the discrepancy in space within the barrel of the connector or terminal. In applying solderless terminals, however, the absence of the third metal (solder) makes a much more precise operation necessary. The manufacturer, therefore, has stamped or marked the size on every terminal. This is given in A.W.G. or other sizing designation commonly used by the industry. The gauge of the wire in use is certainly known by the user. Therefore, it is a simple matter to select the equivalent size of terminal or connector.

Rule 2—Wire Preparation. The skinning or stripping of insulation from wire ends is a common procedure. Carelessness in this operation, however, can result in some bad conditions. Wire strands can be lost or nicked, shreds of insulation may be left around the wires and, in some cases, it may be found that insulation has been forced between the strands of the cable as often happens with extruded or molded types of insulation. The wire ends, therefore, should be relatively clean, free of remnants of insulation although it is not necessary that the wire strands be tinned. Cut or lost strands should be avoided if full conductivity of the wire is to be realized.

Rule 3—Use of Correct Tool. It frequently occurs that the staking, crimping, or lugging is accomplished by the use of any random installation tool, provided it appears to be reasonably near the right size for the job. Tools of one manufacturer are, unfortunately, often used to install terminals made by another manufacturer and, more than once, it has been noted that solderless terminals have been installed with side cutters or diagonals or alligator pliers. In rare cases, installations have been noted which have the appearance of having been hit with a hammer. These ridiculous extremes are rare indeed, but it is important to use the exact tool recommended by the manufacturer of the terminal. The reason for this is that the metal thickness in the terminal has been carefully selected to match up with a crimping notch in the tool, which is held to close dimensions. True, a terminal applied and squeezed by any random method may actually hold to the wire, but the electrical and mechanical performance cannot be predicted to any satisfactory degree.

Rule 4—Correct Use of Tool. Some of the solderless terminal installation tools are so simple that their correct use is almost obvious. With some of the more complicated types of terminal installation a little more care must be exercised in properly locating the terminal in the correct position for crimping. This is especially true of terminals which provide insulation support and those which in addition to providing insulation support also provide pre-insulation of the terminal body. Consider for the moment the pre-insulated type of terminal which provides insulation support. This terminal, in one application of the tool, combines all the operations which by other methods break down into three or four operations. For example, when a soldered type of terminal is applied, the soldering operation is performed; the ears or lobes extending at the rear of the terminal are then wrapped around or squeezed into a position which will support the wire insulation; then the connection must be wrapped with tape or covered with a piece of sleeving to provide insulation. With all these functions (attachment of terminal, supporting of wire insulation, and the providing of an insulated termination) performed in one operation by the use of the pre-insulated solderless terminal, one can afford to exercise a little care in the correct placement of the terminal within the tool. The manufacturer provides instructions for proper application. Adjustments on the tool facilitate variations in the insulation grip pressure so that more than one diameter of insulation may be accommodated by the same tool. It is also important to close the tool to the full extent prescribed by the manufacturer. Some tools now available have precluded the possibility of the operator failing to do this. Such tools cannot be opened for receiving the next terminal until the crimping operation in progress has been fully completed. Power tools are also available which "do not get tired" and, therefore, introduce no human element of error.

Make it a point to become familiar with the operational rules recommended by the manufacturer since it is as easy to do it this way as it is to do it the wrong way.

Rule 5—Visual Inspection. A properly installed solderless terminal or connector has a neat, uniform, clean-cut appearance. This, after a short period of use, will become a familiar sight to the operator or inspector. Manufacturers of solderless terminals generally provide pictures of the finished or installed product. Any major departure from the usual clean-cut appearance of an installed connector or terminal should be interpreted as a malfunction of some phase of the installation process. Non-centering or mislocation of the usual crimp marks or indentation would indicate carelessness in locating the terminal

in the tool; bulges, bumps or gouges in the installed terminals might indicate a broken or chipped installation tool. In general, electrical performance of solderless terminals follows very closely on the mechanical excellence of the joint or bond; therefore, an occasional spot of secureness or a tensile test may be extremely helpful in determining quality performance.

Rule 6—Care of Installation Tools. Solderless terminal installation tools are carefully manufactured to close tolerances and high quality; thus, they are precision tools. They are not multi-purpose gadgets, but rather are highly functional one-purpose devices. The use of a crimping tool for a hammer might be compared to the use of a micrometer for a "C" clamp or vise. Use the tool only for crimping terminals and enjoy the long period of service which the manufacturer has built into it.

The above rules and conditions are those which have been compiled and proved through years of trouble-shooting on work involving solderless terminals and connectors. Most terminal applications run smoothly enough, but it is interesting to note that cases of inferior solderless connector or terminal installation have been directly traceable to a lack of observation of one or more of the above rules.

T. C. FREEDOM
Aircraft-Marine Products, Inc.

Application Tools Assure Good Connection

Pressure type terminals are applied with special tools that indicate proper application either by handles being brought together in the case of hand tools, or by the two halves of the die being brought together in the larger power tools. The trend with hand tools is towards a locking device that, once the operation has been started, will not allow the jaws to be reopened until the application has been properly completed. At least one company engraves the pressure surface of the larger dies with the die number; the clarity of the impression on the terminal thus serves both as a visual check as to correctness of operation and correctness of size of die for that particular terminal.

While the quality of the terminal application does require that the workman complete a definite operation, it is one that requires no particular skill, as contrasted with a soldered terminal where a certain amount of skill is required. We believe that the likelihood of making a good joint is as great or greater with pressure as with solder type terminals.

As an additional precaution, we are setting up a procedure whereby our laboratory makes a periodic check of performance for quality control.

Our experience to date has shown that, while we have had little trouble with failure of terminals, we have experienced less trouble with pressure than with solder type terminals.

R. L. CHAPMAN
General Electric Company

Cleaning Diesel Motors and Generators

(*Continued from page 519*)

thoroughly cleaned. If water is applied to insulated parts, the pressure should not exceed 25 lb. per sq. in. Grease and oil may be removed from the insulation by means of an approved solvent.

When deposits of grease, chemicals, or other foreign matter are to be removed from apparatus, the use of a steam spray machine, frequently called a "steam jenny," may be useful. Portable units may be used which generate steam electrically and project a pressure spray of hot cleaning solution through hose and nozzle. Valves are provided, which make it possible to use steam or a water rinse if desired.

The spray cleaning equipment may be modified to use steam from a shop line, or a spray of hot water and compressed air, if desired.

To avoid damage to insulation, it is advisable that the temperature of the water or cleaning solution should not exceed 90 deg. C, or 194 deg. F., and the pressure at the windings should not exceed 25 lb. per sq. in. After any cleaning operation where water is used the surface moisture should be removed with a clean cloth, and the insulation should be dried promptly to keep the amount of water which soaks into the insulation, as low as possible.

Cleaning Silicone Insulation

Cleaning of Silicone treated windings is a special case. Standard organic solvents which are used for cleaning, including petroleum distillates, may attack silicone varnish and should not be used. It is suggested that design engineers be contacted for advice before cleaning any equipment which has been treated in this varnish.

Summary

1—Electrical apparatus containing conventional insulation should be cleaned with petroleum solvents of the safety type if the insulation is to be reused. Specialized apparatus employing Class H insulation should be cleaned with water and a suitable detergent.

2—Recommended cleaning methods include: (a) wiping with a clean dry cloth; (b) blowing out dirt with compressed air; (c) drawing off dirt by suction; (d) removing dirt with solvent (safety-type petroleum solvents only); and (e) wash off dirt with water and suitable detergent.

3—Very strong solvents, particularly those in the vapor phase are injurious to varnish films and resin bonds and should not be used. Damage caused by them can not usually be repaired by subsequent treatment or impregnation.

4—Chlorinated solvents are not recommended.

5—Coal tar solvents are not recommended.

6—Adequate ventilation is essential to avoid fire, explosion and health hazards.

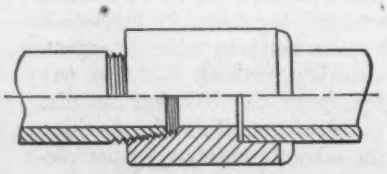
NEW DEVICES

Welding Flange for Air-Brake Piping

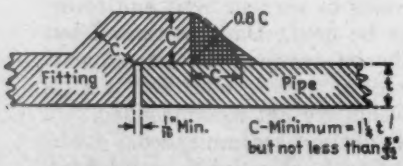
The Watson-Stillman forged-steel socket welding flange for use on AB brake systems was developed after careful study and discussion with many railroad air-brake engineers to eliminate brake-pipe failure due to breakage and leaks. This flange, which has already been approved by the A.A.R., retains the facing dimensions and groove for the rubber gasket that permits simple and speedy interchange of all component parts in the present AB system. The improvement in the flange is in the manner in which the pipe is joined to it.

The flange is provided with a socket or counterbore that slips over the end of the pipe and is then welded on the outside of the pipe to the face of the flange with a standard fillet weld. The particular advantage of the socket weld is this clean outside-the-pipe fillet weld that eliminates inside-the-pipe welding bead, slag debris, or icicles. There is no need for a backing ring, with the result that a clean streamline internal passage is assured.

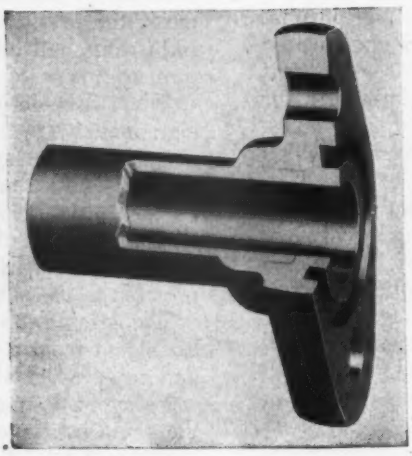
Assembly is simple and fast—merely cut the pipe, insert in the fitting socket and weld. The deep socket holds and aligns the pipe and also eliminates the necessity of cutting pipe to exact length, providing ample come-and-go. The finished assembly is a permanently tight leak-proof joint, with the result that failures in air-brake piping can be reduced to a minimum.



A combination screwed and weld-end coupling



Minimum dimensions for the socket-and-fillet weld for welded pipe fittings



With the development of this welding flange it is now possible to have a completely welded air-brake pipe system. For connecting two lengths of pipe together a socket welding coupling is used. In addition, there is the combination screwed and socket welding coupling for use on the end of the brake pipe. This is illustrated.

There often are many places where other types of socket welding fittings can be used, such as 90-deg. elbows, tees, or 45-deg. elbows. All of these fittings are provided with the same type of socket or counterbore that slips over the end of the pipe in the same manner as the flange.

Early in the development of welded-pipe systems a serious need was felt for a simple and dependable type of weld suitable for small diameter piping (3 in. and under). Socket welding proved to be the best answer to this problem. Pipe fittings of this type first were offered on the commercial market about 1934. As early as 1928 the U. S. Navy had experimented with this type weld, searching for a pipe joint which would resist breakage or leakage due to shock and vibration. They are now used by the Navy in great quantities. Navy specifications have been set forth on Bureau of Ships drawing 3-S-530. For general industry the specifications for socket-welding fittings have been standardized under the American Standards Association Specification B16.11.

The chief concern of the various specifications is with the socket wall thickness. They require that the socket wall be a minimum of one and one-quarter times the pipe wall thickness. This proportion provides a throat dimension in the weld at least equal to the pipe wall thickness. The intent of this provision is to insure having the fillet weld as strong as the pipe. It is actually stronger than the pipe.

Sabin Crocker, senior engineer, engineering division, the Detroit Edison Company, and the author of "The Piping Handbook," says: "Numerous tests* have demonstrated that the strength of socket welds having an area of throat at least equal to the area of pipe wall surpasses that of the pipe both under bursting pressure and under combined tensile and shear tests. Hence, the design of the fillet weld covered in the Standard is deemed amply strong, particularly so within the range of ⅜-in. to 3-in. nominal pipe sizes."

All the pipe fittings proposed herein are of forged-carbon steel, conforming to the requirements of A.S.T.M. Specification A-234 and A.S.T.M. A-105 Grade II.

	Minimum
Tensile strength, 1 lb. per sq. in.	70,000
Yield point, lb. per sq. in.	36,000
Elongation in 2 in., per cent	22
Reduction of area, per cent	30

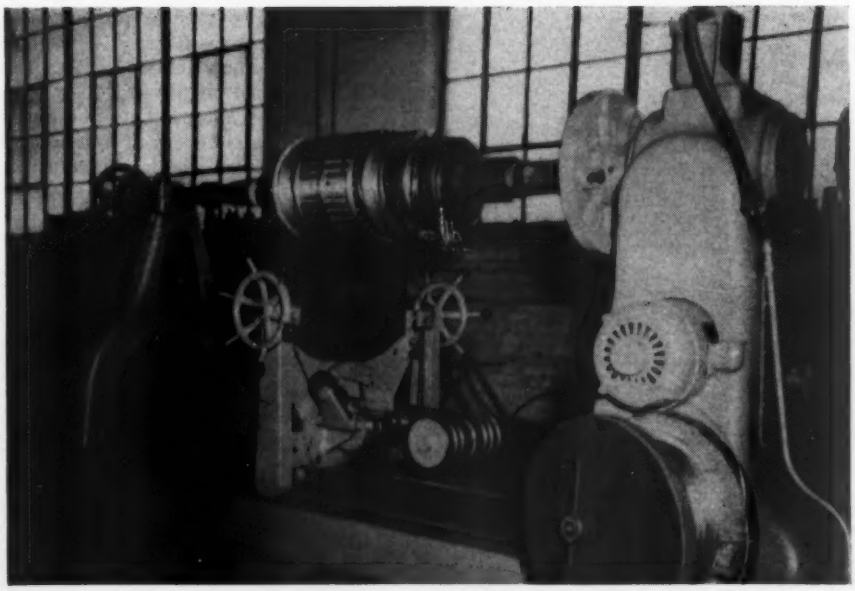
These fittings are manufactured by the Watson-Stillman Company, Distributor Products Division, Roselle, N. J. The steel is especially selected for its welding qualities in conjunction with pipe. All fittings are machined from solid-steel drop forgings.

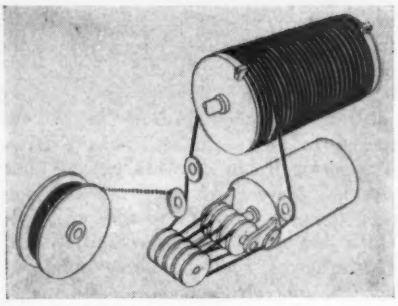
* See "Application of Welding for Piping and Pipe Fittings," Bureau of Construction and Repair, U. S. Navy Technical Bulletin No. 7-29, October, 1929, and "Investigation of Gas and Arc Fillet Welds in Piping," by Irving H. Carlson and Eric R. Seabloom, before the American Welding Society, October, 1940.

Banding Lathe

Banding lathes for railroad traction motors now being made by the National Electric Coil Company, Columbus, Ohio, include a built-in tensioning device for re-roll banding. The machine shown in the illustration is used for banding rewound railway traction motors in the manufacturer's Columbus service shop.

The lathe has a free swing diameter of 40 in. and spindle speeds of 15, 30, 45 and 60 r.p.m. The spindle is driven by a 3-hp. motor, and its direction of





rotation can be controlled from either side of the lathe. A foot-button control starts and stops the machine, and this also may be used on either side.

The machine has a worm gear drive with headstock face plate and center, and a live center in the tail stock. There is adjustable control for preliminary tension and for unreeling the supply located adjacent to the headstock. The supply spool dereeler spindle with brake and automatic hole adapters extends from the back side of the headstock pedestal. Tension blocks are used for reaving the wire.

Banding wire guides and ultimate tension rolling mechanism are mounted on a carriage on the bed plate under the armature in the machine. For re-rolling, the banding wire which is wound on the armature is also reaved over two sets of sheaves. One of the sheaves is stationary and the other is moved by the piston of an air cylinder. When the desired number of turns are accumulated on the armature, the supply from the reel is cut and secured to the other end of the wire which runs over the sheaves and is wound on the armature. In the diagram, the dotted line shows how the wire is run from the reel, and the solid line shows the position of the temporary band when it is looped ready for re-rolling.

Applying air to the cylinder takes up slack between the sheaves, and puts tension on the wire. Normal re-rolling tension is about 400 lb. The winder is designed to produce any tension desired up to 1,000 lb. This occurs when the air pressure in the cylinder is 100 lb. Up to 21 in. of slack may be withdrawn at rolling pressure without cutting and re-starting. This is sufficient in most cases for hot rolling, and more than enough for permanent banding.

Brake Beam with Key-Locked Heads

The Buffalo Brake Beam Company, 140 Cedar street, New York 6, announces a new brake beam to be known as the Truslock. It has been under development and in service tests for three years, and is Buffalo's answer to the need for replacing the present No. 3 and No. 15 brake beams with a more efficient brake beam better suited to present-day operating and maintenance requirements.

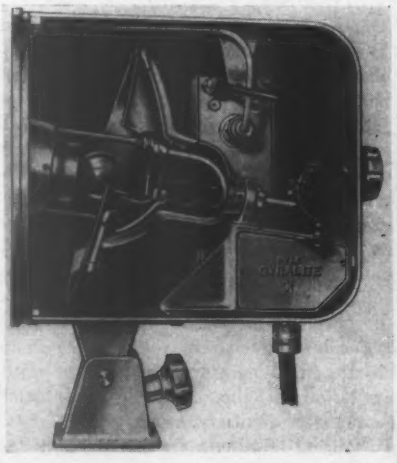
It has been developed from statistics obtained in a recent survey that approximately 50 per cent of all freight-car brake-beam failures were caused by worn brake heads. The outstanding feature of the Truslock brake beam is a removable brake head which is not a fixed part of the permanent brake-beam truss proper but which may be slipped on and off as easily and as quickly as a brake shoe, so that a car need no longer be cut out for replacement of the entire brake beam. With the Truslock system, the car inspector merely drops one side of the brake beam, pulls one simple spring key, and the defective brake head is slipped off of the beam and a new head slipped in its place.

This procedure not only achieves a tremendous saving in time and effort from an operating standpoint, but it should also cut brake-beam reclamation costs in half by completely eliminating the necessity for rebuilding all brake beams pulled out of service by reason of excessive head wear. Under existing A.A.R. rules all No. 3 or No. 15 beams now submitted to reclamation for excessive head wear must be rebuilt with a new tension rod and new nuts, and subjected to test before being returned to service. On some railroads this procedure now costs in excess of $6.00 per beam, exclusive of the labor costs of removing and replacing the defective beam, and transportation costs to and from the reclamation plant.

As an added economy the Truslock beam will effect a marked reduction in brake-beam inventory, by reducing the number of beams required for stand-by service, as well as the number of beams in transit to and from reclamation plants, or actually in the process of reclamation.

Automatic Train Warning Projectors

Train warning lights made by the Pyle-National Company, 1334 North Kostner avenue, Chicago 51, feature simplicity, having only one lamp, one reflector, and one motor to move the beam through the established pattern and to change the beam color, when desired, from white to red. Known as the Gyralite, this product is made in either single-purpose or multi-purpose types, the difference between the two being that the multi-purpose has an automatic color-changing device that the single-purpose Gyralite does not have. The warning light is also made in several designs and for either head-end or rear end mounting.



The automatic air pressure type functions with an air brake application, and has automatic trip and manual reset for both single-purpose and multi-purpose Gyralites. The automatic generator voltage type is controlled by train speed with automatic transfer from axle generator to battery and vice versa. It is used only for single-purpose Gyralites at the rear of trains. The manual, headlight interconnected type automatically extinguishes the locomotive headlight for maximum visibility of the red warning signal and automatically restores the locomotive headlight in the event of a lamp failure in the Gyralite. This is used for both single-purpose and multi-purpose Gyralites. The manual selective type simultaneously controls the locomotive headlight by opening and closing the headlight circuit when the Gyralite is turned on and off. It is for single-purpose Gyralites at the front of trains.

The gyrating beam from the Gyralite forms a conical pattern with the vertex in the projector. The center line of the beam is aligned parallel with the track when at the lowest point in its gyrating path. Thus approaching trains intercept the full intensity of the light at the bottom of each sweep, and in all other positions the beam is projected above the horizon. The beam is never projected toward the ground where the light is wasted and disturbing to the vision of the locomotive crew. The rotative speed is slow enough to permit continuous observation of the projected beam throughout its circular path.

The motor has grease-sealed ball bearings and brushes with flexible pig tail leads to insure a solid current path. The gear housing has bronze bearings and is totally enclosed and grease packed. Since both the motor and the lamp holder are stationary, there are no moving lead wires to the lamp holder or motor to wear out or cause failure as a result of constant flexing.

Heavy Duty Arc Welder

The Air Reduction Sales Company, New York 17, announces the immediate availability of a new heavy duty arc welder. Known as the Wilson 36A "Yellow Jacket," this machine is built in 300- and 400-amp. sizes. The generator is a direct-current, 40-volt, N.E.M.A. approved, variable voltage machine. It features simplified control of current output by means of a sturdy hand-wheel mounted on the control cabinet. Close calibration of the current dial eliminates the need for meters.

For instant recovery voltage over short circuit, the generator is self-excited with excitation of the main field obtained through an auxiliary brush.

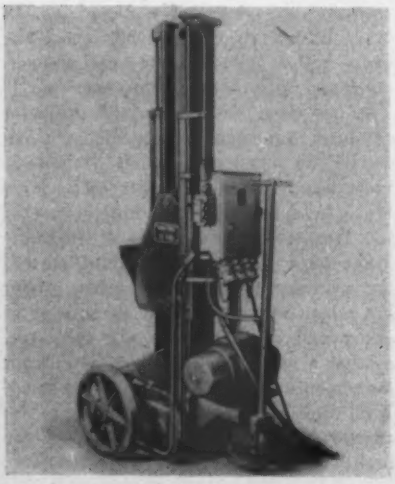
Welding terminals are conveniently located and adequately spaced to prevent accidental shorting between the lugs of the welding cables. The set is a complete two-bearing unit, engine-driven by sheaves and steel cored V-belts. The belt drive reduces vibration problems in the field by automatically compensating for slight misalignments. Precision ball bearings equipped with double shields keep dirt out and hold grease in providing maximum load safety.

The set is powered by a six-cylinder industrial engine and is available in stationary or portable models. It is 76 in. long, 28 in. wide and 49 in. high.

Optional equipment includes either a two or four-wheel, high speed, spring-mounted trailer equipped with pneumatic tires for use with the portable model.

Whiting High-Lift Portable Jack

The Whiting Corporation, Harvey, Ill., has recently announced a Model M improved electric jack, built in 25 and 35-ton sizes, which furnishes a high-lift of 4 ft. 3 in. when needed for lifting passenger cars and locomotives while changing trucks. These jacks are a lightweight design in which special attention has been given to safety, each jack standing solidly on a substantial steel base large enough to give firm ground footing. The load is sustained on powerful alloy steel screws with machine-cut buttress threads and the screws are operated by self-locking worm gearing. The load is automatically held in place in the event of power failure.



When a set of four jacks is used to raise an entire car or locomotive, the operator can stand at any convenient point to watch the operation. He has complete control at his fingertips and, since the jacks operate at the same speed the car or locomotive is maintained level both in raising and lowering. Any one jack in the set can be operated individually or all operated at the same time. Top and bottom limit switches prevent overrunning of the lifting brackets.

The Type-M Jack is mounted on three large rubber-tread wheels two in the rear which take most of the load when being moved, and one in front for steering. When in position for lifting, these wheels are released by a special forked crank mechanism so the jack base rests solidly on the ground.

Power for operating the jack is supplied by a reversible electric motor connected to the worm by a chain drive. The motor has a disc brake, and limit switches prevent overtravel at either top or bottom. A control box and push button is mounted on each jack. By means of interlocking controls, two or four jacks may be operated in unison from one portable push-button station.

The standard lifting speed is 9 in. per minute and the effective lift, 4 ft. 3 in. The low position is 2 ft. 7 in.

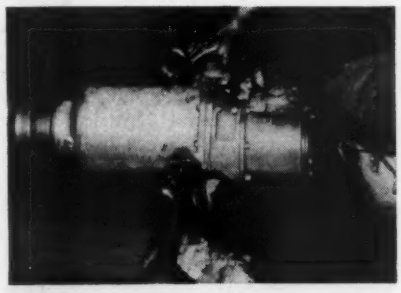
Rapid Curing Baking Varnish

A blend of synthetic gums and drying oils, known as Synthite BC-302, is a new clear baking varnish now being made by the John C. Dolph Company, 1060 Broad street, Newark, N. J., especially formulated to give an extremely rapid cure. In addition to this advantage, the cured film possesses excellent dielectric properties plus a high degree of resistance to water, oil and chemicals. The high bonding strength of this all-purpose varnish makes it adaptable to such applications as armatures, both low and high speed, stators (fractional hp. and up), transformer coils, motor fields, fluorescent ballasts, etc. It will perform equally as well on all types of coated magnet wire such as Formvar, Formex, Glass and Nylon. Whether applied by atmospheric dip or vacuum impregnation, the penetrating properties of BC-302 are said to be good. A completely cured, tough flexible film can be attained by either conventional oven or near infra-red baking methods.

The build-up of Synthite BC-302 is from 4-5 mils with a dry dielectric strength of over 2,000 volts per mil and a wet dielectric strength of over 1,300 volts per mil. It does not require a special solvent and may be thinned with naphtha.

Heavy-Duty Air-Impact Tool

Known as the Slugger, the size 588 impact tool is the largest of its type manufactured and is rated up to 4 in. bolt size. Capable of handling both maintenance and production work, it has been designed for speedy repair of heavy



equipment and to save time in the assembly of all types of machinery involving large studs, bolts, and nuts.

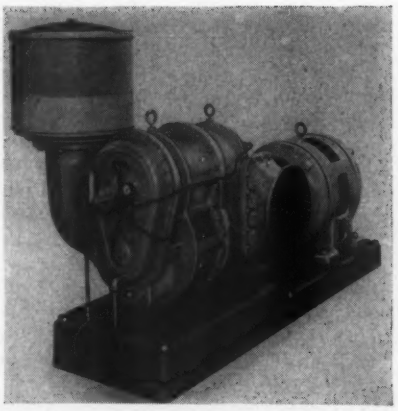
The unit has been added to the line of industrial devices manufactured by the Ingersoll-Rand Co., Phillipsburg, N. J., for extremely heavy bolting-up jobs formerly handled by sledging or battering box wrenches.

The impact tool weighs 215 lb. and has a free speed of 355 r.p.m., with 550 impacts per min. Overall length to shoulder of anvil is 26⅝ in.; side to center distance of the hammer case is 4 in. It operates with a 2½ in. square driver. Standard equipment includes a safety live-air handle with independent reverse; suspension ring and dead handle.

Positive Displacement Axial Flow Blower

The illustrated Standardaire blower, with its wide range of pressures, is essentially a high speed unit which permits direct drive by standard motors in the most efficient speed. With the symmetrical epicycloidal rotor form acting as an air screw, the air is taken in and discharged from pockets which form between the rotors. These developments make possible a blower of low weight for given capacities.

The blower, manufactured by The Standard Stoker Co., Inc., 370 Lexington ave., New York 17, has variable capacities and is available in ratings from 100 to 15,000 cu. ft. of air per min. and for



pressures up to 20 lb. Since the power needed to operate the blower decreases with the decrease of air delivery, the overall power requirements are low.

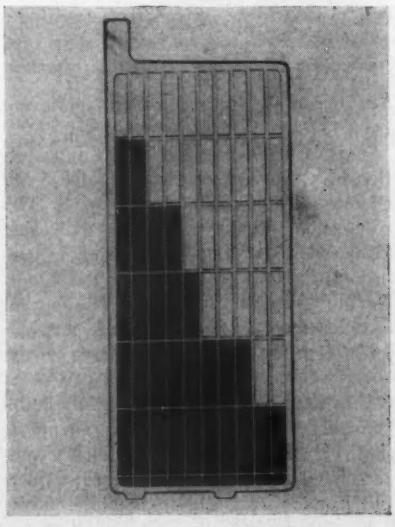
The blower casing sections are of cast construction designed for maximum strength. Anti-friction bearings with special thrust provisions are used to support the rotors and maintain their correct positions.

Where service conditions require the use of other than standard materials, special designs can be made upon request.

Better Lead Batteries

The Gould Storage Battery Corporation, Trenton, N. J., announces a new line of greater-performance, motive power, Diesel-starting, and railroad air-conditioning and car-lighting batteries, known as the "Z" plate line. The basic improvement is a new grid resulting from years of laboratory research into lead porosity phenomena and grid casting techniques. All models of the "Kathanode" and "Thirty" types will include the new grid, bringing the advantages of improved electrical characteristics to users of industrial storage batteries.

It has long been an established fact



that the positive grid was the part of the lead-acid battery which wore out first. One of the positive grids, partially filled with active material, is shown in the illustration.

Studies showed that positive grids of all makes of lead acid batteries failed because the grid-members separated after performing a certain amount of work, and further that this separation was caused by voids and porosity which were invariably present in the grid framework as cast. This porosity presented weak spots which permitted the sulphuric acid of the electrolyte to attack, and finally separate, grid members.

Gould research has developed new casting rates and new molding temperature control techniques which reduce grid porosity from 85 to 90 per cent and hence reduce vulnerability to sulphuric acid attack, with the result that longer life and better electrical characteristics are assured. "Z" line batteries containing the new grid are now in production.

Fluid Chemical Tapping Compound

A companion to Cimcool cutting fluid has been introduced by the Cimcool Division of Cincinnati Milling Machine Company, Cincinnati 9, Ohio. The product, a chemical emulsion, is called Cimcool Tapping Compound, and can be brushed directly on the tap.

This compound which replaces all water emulsions and all but a few highly compounded specialty oils, is readily soluable in water and does not pile up on the tapping machine to form a film on the reservoir. It can be used to increase tap life because welding of chips to the tap is eliminated when used on materials such as steel, cast iron, stainless alloys, nickel alloys, aluminum and die castings.

Insulating Film

A new electrical insulating film for coils has been announced by the Minnesota Mining and Manufacturing Company, 900 Fauquier street, St. Paul 6, Minn. It is a plastic film that is applied like tape and then heat-treated, causing it to be bonded into a unified layer of insulation.

The cured film "has high dielectric strength and good resistance to heat, moisture, oil and most solvents," according to the producer. In most applications, the film is used without other materials.

Trademarked "Scotch-Weld" electrical insulating film No. 70, the new film is made entirely of synthetic resins, with no plasticizers or fillers.

It is provided in 60-yd. rolls like tape, in widths up to 42 in. and in thicknesses of 2, 4, 6 and 8 mils. It is not sticky to the touch.

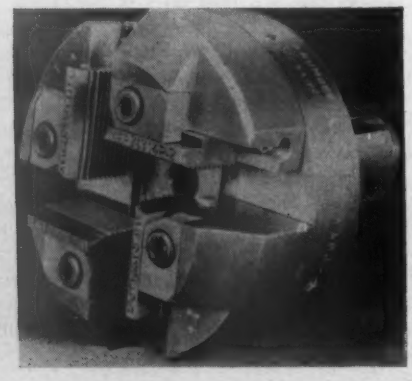
After being wrapped around a coil, the film is cured by heat-treating 1 to 2 hours at temperatures usually between 200 and 300 deg. F, depending on requirements of the finished product. Dielectric strength varies with degree of heat cure, ranging up to more than 1,750 volts per mil of thickness on a fully cured film.

Adjustable Die Head

The illustrated die head made by the Landis Machine Co., Waynesboro, Pa., is designed for use on automatic machines for threading street ells and similar cast iron fittings where clearances are limited between the die head and the machine. The diameter of the die head is 3¾ in. To provide further clearance, the chaser holders are beveled off on a 45 deg. angle.

The die head, made of air-hardened steel, consists of a body with the alloy steel chaser holders mounted on the face of the head body. Individual adjustment is provided for each holder, which permits a plus or minus adjustment of approximately 1/32 in. on the pitch diameter. A different set of chaser holders is required for each diameter although the same head body can be used.

The head, which is only recommended for use on cast iron and brass fittings, is driven by means of square on the shank and is centered by a cylindrical portion of the shank. It is held in position by means of a draw rod through the spindle and uses chasers 15/16 in. by 1¼ in.



Low Heat Alloy and Flux

A package containing Eutec-Die Cast-Weld with a jar of Eutector Flux has been introduced by Eutectic Welding Alloys Corp., 40 Worth st., New York 13, for shop use, for buildups, repairing zinc die castings and joining die castings to aluminum, steel, brass and bronze.

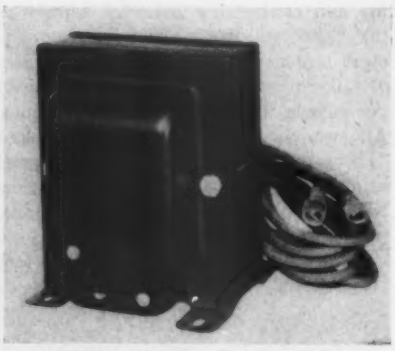
The welding of carburetors, fuel pumps, ornaments, hardware, aluminum parts and overlay work are a few of the many uses to which this alloy may be applied. It bonds at 60 deg. F. and has excellent color match to zinc die castings.

The corrosion-resistant alloy is fluid and actually is as easy to handle as an ordinary aluminum welding rod. It is designed for use with oxyacetylene, oxy-hydrogen and other similar gas torches.

This low heat alloy can be used with or without the flux. With its flux, greater fluidity is achieved. Without it, buildups and overlays are possible. The package contains 36 ft. of 1/8 in. diameter alloy and will average up to 200 welds.

Power for Tools From Highway Vehicles

Automotive equipment operators whose vehicles are equipped with the Leece-Neville Company's rectified a.c. generators may now operate standard 110-volt



a.c. tools, lights, and other appliances from the vehicle's electrical system.

This is made possible by the introduction of a transformer that steps the 6-volt current of the car's system up to 110-volts a.c. The transformer, delivering 250-watts at variable frequencies, is connected direct to one phase of the Leece-Neville system's alternator. The output is taken from a standard female a.c. outlet which is an integral part of the transformer.

The alternator-transformer combination furnishes sufficient power for the operation of small motor-driven tools (universal motor types up to ¼ hp.), soldering irons, wire recorders, mobile public address systems, extension lights, flood lights, and the like.

Maximum output and efficiency of the transformer is obtained even when the car engine is operated at idle speed, and the alternator system functions normally in the maintenance of a high rate of battery charge at the same time.

Two of the transformers, connected to two phases of the three-phase alternator unit in an open delta circuit, also may be employed to provide three-phase, 110-volt current for the operation of high frequency tools. In this application a maximum of 433 watts output is obtained. The transformers are made by the Leece-Neville Company, 5109 Hamilton avenue, Cleveland 14, Ohio.

Load Visualizer

An improved a.c. load visualizer, combining 5 instruments in one, has been announced by General Electric's Meter and Instruments Divisions. Besides serv-

ing as a standard 0-2.5/5/25/50-amp. ammeter and a 0-150/300/600-volt voltmeter, the device can be used with a split-core or conventional instrument transformer to extend the range for determining watts, vars, volt-amperes, and power factor.

Designated as the Type AF-2, the new instrument can be applied in load surveys, induction motor tests, reactive power studies, and power factor checks in power and lighting circuits.

The load visualizer is self-contained to 50 amp.; extensible to 1,000 amp. by split-core current transformer. This provides a hook-on feature, enabling surveys to be made without interrupting service or cutting conductors.

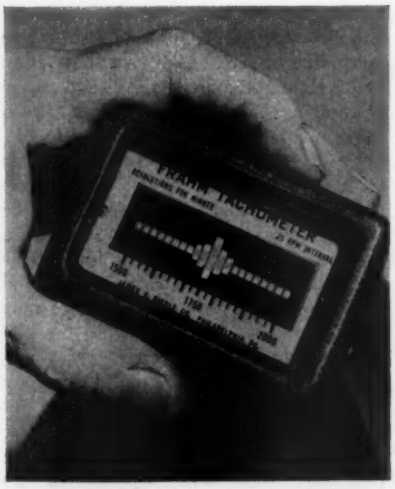
The instrument was designed to meet the need in industry for a small, lightweight analyzer with a few, simple connections. It is magnetically damped, fully shielded, and equipped with an external zero set. All readings are made on one dial.

Housed in a sturdy, grease-proof textolite case with a detachable leather carrying strap, the AF-2 measures 6¼ in. x 8 in. x 4 in. It is furnished in kit form including voltage leads, instruction cards, calculator, and a sturdy, felt-lined carrying case. In addition, instruments for higher ratings are available in similar kits which include the Type G-4 split-core current transformer with its leads.

Accuracy of indication of the load visualizer has been determined to be within 2 per cent for volts and amperes and within 5 per cent for component amperes. Frequency range is 50/60 cycles.

Resonant Reed Tachometer

A low-cost miniature Frahm resonant-reed tachometer which requires no contact with a rotating element and imposes

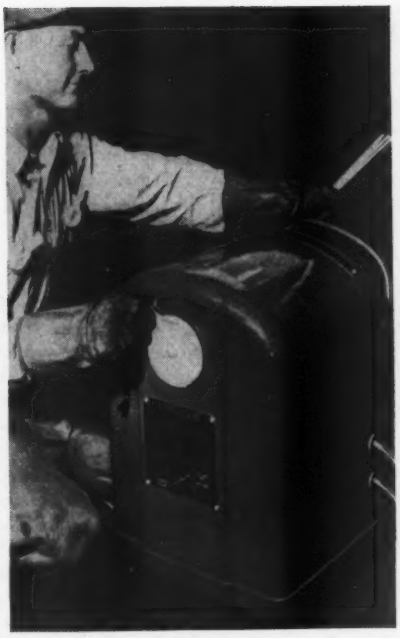


no load on the machine under test, is now being offered by the James G. Biddle Company, 1316 Arch street, Philadelphia 7, Pa. It cannot be injured by over-speeding and requires no maintenance. It measures vibrations as well as revolutions per minute, and is available in various ranges between 1,000 and 13,000 r.p.m.

Cases are available to accommodate one or three instruments, or 60 deg. or 90 deg. brackets for permanent mounting.

Low Cost A.C. Welder

The Lincoln Electric Company, Cleveland, Ohio, has announced a new model 200-amp. a.c. industrial type welder, priced at $180.00. The unit is designed for both job shop welding and industrial welding. Electrodes ranging in diameter size from 5/64-in. to ¼-in. may be used with it.



The welder includes the Lincoln Arc Booster which causes an extra burst of current which starts the arc and secures penetration at the start of the weld. The current automatically returns after a few seconds to the correct amount set for the job.

Continuous fine adjustment of the welding current through the complete range is secured by a few turns of the control handle on the front of the case. A readily visible dial on top of the case indicates the current setting. The welder also has a lower open-circuit voltage than is normally required, which reduces power consumption, operating costs and makes the welder safe to use.

The complete unit is enclosed in a pressed steel case 25 in. high. There are no moving coils or leads in the windings and both coils and control reactor are firmly clamped in position to give vibration-free service. Heavy copper windings are insulated with spun glass and mica separators, placed in a welded steel laminated frame.

The unit is equipped with wheels for portability at no extra cost. Total weight is 319 lb.

Plastic Fabric for Covering Seats

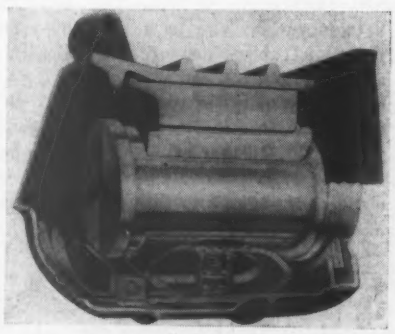
Known as Reevon and made from woven monofilaments of Bakelite polyethylene, a plastic fabric, has been announced by Reeves Brothers, Inc., 54 Worth St., New York 13. It is suited for use as seat covering for automobiles, busses, trains, offices, etc.

Reevon is completely odorless and remains pliable even in extreme cold. It is non-toxic and is resistant to moisture, acids, stains and vermin, and is so light in weight that it floats in water and may be cleaned simply with soap and a damp cloth.

Mechanical Lubricator For Car Journals

A journal-bearing lubricator for use with standard brasses and wedges in A.A.R. car journal boxes has been developed by the Hennessy Lubricator Co., Chambersburg, Pa. In principle, this device is similar to the Hennessy driving-box lubricator in that it delivers oil to a distributor on the under side of the journal box by a pump actuated by the lateral motion of the axle.

In the car lubricator the pump is actuated by a lever which, in turn, is moved by the lateral motion of the end of the axle. The oil is delivered by the pump to a distributor in the form of a felt pad attached to a light metal back which conforms to the curve of the journal. This is retained in contact with the journal by double-leaf springs, the upper leaves of which are attached to the pad and the lower leaves to the base of the device. The standpipe from the pump to the pad is held in place by coil springs.



By compressing the springs the entire device may be removed from the journal box without disturbing the brass or wedge. Conversely, the bearing and wedge may be removed and replaced without disturbing the lubricator.

The positive mechanical action of the pump supplies a constant dependable quantity of oil to the journal. Since the delivery of the oil does not depend upon capillary action, there is no failure of lubrication due to glazing of the packing or to soggy packing which settles away from the surface of the journal. There being no waste in the journal box, the lubricator does not cause waste grabs. Since viscosity has no effect on the delivery of oil to the journal, the viscosity of the oil used can be such as to insure effective separation of the adjacent surfaces of the brass and the journal.

NEWS

J. V. B. Duer Awarded Medal By Franklin Institute

JOHN VAN BUREN DUER, who retired in 1947 as assistant to vice-president, operation, of the Pennsylvania, has been awarded the George R. Henderson Medal of the Franklin Institute "for his resourcefulness and contributions in the coordination of railroad engineering matters, especially in the electrification of the Pennsylvania." The medal will be presented to Mr. Duer by Richard T. Nalle, president of the institute, at ceremonies in Philadelphia, Pa., on October 19.

A.S.M.E. Fall Meeting

THE fall meeting of the American Society of Mechanical Engineers will be held at the Hotel Lawrence, Erie, Pa., September 27 to 30, inclusive.

Registrations and two inspection trips will feature the activities on Tuesday, September 27. The trips will be to the plant of Talon, Inc., at Meadville, Pa., and to the plant of the American Locomotive Company at Dunkirk, N. Y. Beginning Wednesday, September 28, there will be 21 technical sessions. Among these will be two Railroad Division sessions, for which the following program has been prepared:

THURSDAY, SEPTEMBER 29

9:30 a.m.

A Method of Calculating Tractive Force of Reciprocating Steam Locomotives, by John C. Wallace, design engineer, Lima-Hamilton Corporation.

Gas-Turbine Electric-Locomotive Report, by A. H. Morey, project engineer, General Electric Company.

Coal-Handling Systems for Locomotives—Past, Present, and Future, by J. J. Kane, development engineer, Standard Stoker Company.

2:30 p.m.

Railroad Mechanical Testing, by E. D. Hall, engineer of tests and chief chemist, Erie Railroad.

Under-Car Engine-Driven Power Plant for Railroad Passenger Cars, by D. R. MacLeod, commercial engineer, General Electric Company.

Railroad Welding Session at A. W. S. Annual Meeting

THE American Welding Society will hold its 30th annual meeting at the Hotel Cleveland, Cleveland, Ohio, during the week of October 17. As usual the meeting will be held in conjunction with the National Metal Exposition at the Cleveland Public Auditorium.

A total of 77 technical papers are scheduled for the 21 technical sessions. On Thursday morning, October 20, the Railroad Session will present the following four papers: The Evolution of the Welded Freight Car, by L. E. Grant, engineer of tests, Chicago, Milwaukee, St. Paul & Pacific; Oxy-Acetylene Pressure-Welded Rail Saves Maintenance Costs, by Lem Adams, Oxweld Railroad Service Company; Arc Welding in Railroad Shops, by E. Diliberti, Air Reduction Sales Company, and Inert Gas Welding in Railroad Repair and Rehabilitation, by H. E. Gannett, electrical engineer of line property, Chicago, Burlington & Quincy.

The chairman of the session will be Roy F. Johnson, Pullman-Standard Car Manufacturing Company. A. G. Oehler, electrical editor, *Railway Mechanical Engineer*, will be co-chairman.

Coal-Burning Steam-Turbine Locomotive

THE Norfolk & Western has placed an order for a coal-burning, steam-turbine, electric drive locomotive, to be constructed by The Baldwin Locomotive Works, in collaboration with Westinghouse Electric Corporation, and the Babcock & Wilcox Co. The new locomotive is rated at 4,500 hp. and is designed for operation in freight service. The design will make use of exceptionally high boiler pressure combined with the efficiencies inherent in the steam-turbine electric drive to produce an over-all thermal efficiency which will cut the fuel costs to one-half that of the conventional reciprocating steam locomotive.

The boiler will be of the water tube type to produce a steam pressure of 600 lb. per sq. in., roughly double that of the conventional steam locomotive boiler.

Steam from the boiler will drive an impulse type turbine which will operate a two-unit direct-current electrical generator through single reduction gearing. Current from this generator will drive the locomotive through 12 traction motors, one on each axle of the locomotive. The locomotive will have desirable characteristics inherent with all electric drive locomotives; i.e., high starting effort, relatively light axle loading, and no reciprocating parts, plus the advantage of using a low priced plentiful fuel.

The locomotive will have a 4-8-4-8 wheel arrangement and a separate water-carrying tender of 16,000 gal. capacity. Locomotive and tender together in working order will weigh approximately 952,000 lb. and will have a combined over-all length of approximately 148 ft. Twenty tons of coal will be carried in the nose ahead of the operator's cab.

Babcock & Wilcox will build the water-tube boiler complete, Westinghouse will supply the steam turbine, generator, traction motors, and all electrical control equipment. Baldwin will design and build running gear, cab, tender, and other mechanical parts of the locomotive and will be responsible for the final erection.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE AUGUST ISSUE

LOCOMOTIVE ORDERS

Road	*No. of locos.*	*Type of loco.*	*Builder*
Canadian National	3[1]	1,350-hp. elec. pass.	Canadian Gen. Elec.
Erie	1	1,000-hp. Diesel-elec. switch. unit	Baldwin Loco. Wks.
New York, Chicago & St. Louis	6	1,500-hp. Diesel-elec. road switch. units	Baldwin Loco. Wks.
	6[2]	1,500-hp. Diesel-elec. road switch.	Electro-Motive
	4[2]	1,000-hp. Diesel-elec. yard switch.	Electro-Motive
Norfolk & Western	1[3]	4,500-hp. coal-burning steam turbine-elec. drive	Baldwin-Westinghouse-Babcock & Wilcox
Union	5	1,500-hp. Diesel-elec. road switch. units	Baldwin Loco. Wks.

FREIGHT-CAR ORDERS

Road	*No. of cars*	*Type of car*	*Builder*
Seaboard Air Line	25[4]	Caboose	International Ry. Car. & Equip. Co.
Solvay Process Co.	100[5]	Tank cars	General American

[1] For use on suburban lines out of Montreal, Que. The engineman's cab will be centered on the new locomotives. The locomotives will be 42 ft. long, and have a top speed of 60 m.p.h., and weigh 87 tons. They are to be equipped with double controls for operation in either direction. Connection with the overhead power wires will be through twin pantographs. Power will be supplied by four d.c. series motors and the starting tractive force of each locomotive will be 44,000 lb.

[2] The road switchers will cost approximately $135,304 each; the yard switchers approximately $97,924 each. For delivery in November or December.

[3] See item elsewhere on this page.

[4] Delivery of these cars, which will cost $250,000, is scheduled to begin in September.

[5] To be fabricated of heavy aluminum plate with stainless-steel fittings.

SUPPLY TRADE NOTES

CARNEGIE-ILLINOIS STEEL CORPORATION.—*Paul E. Thomas*, chief engineer of the Carnegie-Illinois Steel Corporation's Gary (Ind.) steel works has been appointed assistant to general superintendent and *Daniel E. Wise*, chief engineer at the Clairton (Pa.) works, has been transferred to Gary to succeed Mr. Thomas.

◆

TIMKEN ROLLER BEARING COMPANY.—*H. L. Hexamer*, district manager, Railway division, Timken Roller Bearing Company, St. Louis, Mo., has been transferred to the position of district manager, Railway division, at Cleveland, Ohio. *Paul N. Wilson*, district manager, Railway division at Chicago, will temporarily handle railway sales also at St. Louis where the office has been moved to 2100 South Vandeventer avenue.

◆

ELASTIC STOP NUT CORPORATION OF AMERICA.—*H. L. Bradbury* has been appointed to the newly created position of manager of railway sales for the Elastic Stop Nut Corporation of America,

H. L. Bradbury

Union, N. J. Mr. Bradbury became associated with the company in its production department in 1941 and was transferred to the sales staff in 1943.

◆

WORTHINGTON PUMP & MACHINERY CORPORATION.—*John P. McArthur* has been appointed manager, west coast sales, of the Worthington Pump & Machinery Corporation, with headquarters in San Francisco, Calif. Mr. McArthur will supervise the activities of the Los Angeles, Calif.; San Francisco; Seattle, Wash., and Salt Lake City, Utah, district offices.

◆

L. J. WING MANUFACTURING COMPANY.—*Albert D. Becker* has been appointed a representative of the L. J. Wing Company for the eastern section of New York state, Vermont and Berkshire county in Massachusetts, with headquarters at 434 Clinton avenue, Albany N. Y. *Fred McMeans* has been appointed a representative for British Columbia, with headquarters at 451 West Broadway, Vancouver, B. C.

◆

TEMPLETON, KENLY & CO.—*Mark C. Simpson* has been appointed Pennsylvania division sales manager of Templeton, Kenly & Co., Chicago. Mr. Simpson's headquarters are at Roscoe, Pa.

◆

FAIRBANKS, MORSE & CO.—Construction of a new one-story building, 145 ft. by 250 ft., to house the Chicago branch of Fairbanks, Morse & Co., is now underway at a cost of $500,000, including purchase price of the site at 1544-1558 South State street. The structure is expected to be completed by the end of the year. It is to house the sales and service personnel and warehousing and repair facilities for the company's operations in the Chicago area.

Frank M. Mason, Jr., has been appointed director of engineering of Fairbanks, Morse & Co., with headquarters at Chicago.

Mr. Mason, who has for several years been manager of the Research Division in charge of all research, developments and patents, joined the company in 1922 following his graduation from Northwestern University, the Massachusetts Institute of Technology, and Washington University. He was first employed in the engineering department at Indianapolis. In 1923 he

F. M. Mason, Jr.

was transferred to St. Louis to organize a patent department. In 1925 he entered the Research Division in Chicago where he became assistant manager in 1940 and manager in 1946.

WARNER & SWASEY COMPANY.—*Howard Davies*, field engineer for the Warner & Swasey Co. at Cleveland, Ohio, has been assigned to the Syracuse, N. Y., district sales office of the company.

John L. MacQuown has been appointed a representative of Warner & Swasey in Hartford, Conn., supplementing the company's Cambridge, Mass., district sales office.

◆

CINCINNATI MILLING MACHINE COMPANY.—A new grinding wheel is disclosed in the current issue of "Report from Cincinnati Milling," a technical magazine of the Cincinnati Milling Machine Company. "Report" tells how basic research in the study of metal cutting action, applied to various types of single-point tools and milling cutters, can be used for the improvement of the cutting action of the abrasive grains in grinding wheels. The company's research engineers have been able to ascertain what are the desirable characteristics of abrasive grains as cutting tools and have studied such factors, for example, as pressure, friction and heat, which are cumulative in their effect. Performance records established under every-day operating conditions on all types and sizes of grinding jobs are said to have indicated that the new wheels have characteristics for improved performance. The new grinding wheels, it is understood, are produced in limited quantities only and are not available for the market.

◆

AMERICAN STEEL & WIRE CO.—*Clarence T. Gilchrist*, assistant general manager of sales, Chicago district, of the American Steel & Wire Co. (United States Steel Corporation subsidiary), has been appointed to the newly established post of Western area sales manager, with headquarters at Chicago. *Roswell F. Curtis*, manager of the manufacturers' products sales division at Cleveland, Ohio, and *Howard B. Maquire*, sales manager at Detroit, Mich., have been appointed to the newly created positions of sales managers in the Eastern and Central areas, respectively, with headquarters at New York and Cleveland.

◆

VULCAN IRON WORKS.—*J. F. O'Brien* has been appointed general sales manager of the Vulcan Iron Works of Wilkes-Barre, Pa.

◆

AMERICAN LOCOMOTIVE COMPANY.—*Charles C. Davis*, formerly sales representative for the American Locomotive Company, at St. Louis, Mo., has been appointed assistant to vice-president—Western regional sales, with headquarters at

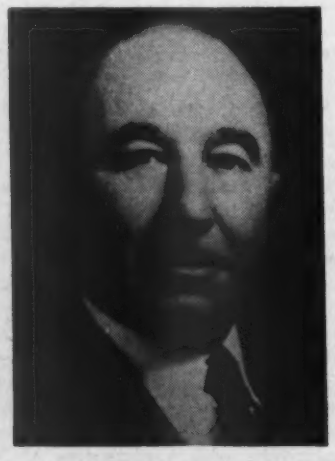
Chicago. *Carl A. Gandy, Jr.*, formerly sales representative at Atlanta, Ga., has been transferred to St. Louis.

Mr. Davis became associated with American Locomotive at the Auburn, N. Y., plant in 1940 and in 1941 was transferred to Schenectady, N. Y. With the exception of three years' service as a captain in the United States Army Transportation Corps, Mr. Davis was service engineer and sales representative at Schenectady until 1946, when he was transferred to St. Louis.

◆

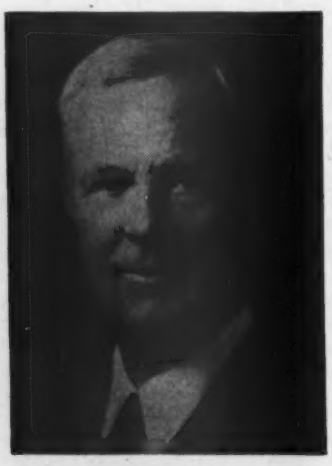
LIMA-HAMILTON CORPORATION.—*John E. Dixon*, president of the Lima-Hamilton Corporation, has been elected chairman of the board to succeed *Samuel G. Allen*, resigned. *D. S. Ellis*, vice-president at Lima, Ohio, has been elected president. *George A. Rentschler* continues as chairman of the Executive Committee and chief executive officer. *W. A. Rentschler* has been elected executive vice-president, and *Henry F. Barnhart*, vice-president in charge of shovel and crane sales at Lima, has become a director.

Mr. Dixon, chairman of the board, received the degree of B.S. in M.E. at the University of Wisconsin. In 1900 he entered the shops of the Brooks Locomotive Works which in 1901 became a part of the American Locomotive Company. He served consecutively as assistant foreman, foreman, draftsman, traveling engineer, and chief inspector until 1904 when he was transferred to the New York office of the American Locomotive Company. He was later assistant manager and manager of the Atlantic Equipment Company and from 1907 to 1916 was salesman and assistant manager of sales for the American Locomotive Company. In 1916 he became vice-president of the Lima Locomotive Works at New York and in 1939 was elected president of the company. Upon the merger of the Lima Locomotive Works and the General Machinery Corporation he continued as president of the Lima Hamilton-Corporation. Mr. Dixon is also a director of Lima-Hamilton as well as of the Franklin Railway Supply Company, Combustion Engineering-Superheater, Inc., Niles Tool Works Company, and the Hooven, Owens, Rentschler Company.



J. E. Dixon

Mr. Allen, the retired chairman of the board, was born on August 24, 1870, at Warren, Pa. He studied law and was admitted to the Bar on August 24, 1891. On January 1, 1900, he left law practice to engage in the railway supply business. He became vice-president of the Franklin Railway Supply Company in 1902. In March, 1910, with Joel S. Coffin, he organized the American Arch Company, and in June of the same year, again with Mr. Coffin and George L. Bourne, the Locomotive Superheater Company which is now Combustion Engineering-Superheater, Inc. In April, 1916, with Mr. Coffin, Mr. Allen purchased and reorganized the Lima Locomotive Corporation. Again with Mr. Coffin and George M. Basford in 1916 he organized the G. M. Basford Company. Mr. Allen is chairman of the board of the Franklin Railway Supply Company, the American Arch Company, and the G. M. Basford Company. He is also chairman of the executive committee of Combustion Engineering-Superheater, Inc.



S. G. Allen

Mr. Ellis, president, was born in Warwick, N. Y., on January 25, 1897, and attended high school at Warwick. In 1916 he became a clerk in the auditor's office of the Lehigh & Hudson River; in 1917, a clerk in the assistant freight agent's office of the New York Central, and later in 1917, a machinist helper. In 1918 he became a draftsman; from 1920 to 1922 was a draftsman, checker, and calculator, and from 1922 to 1924 was a designer and traveling engineer. In 1924 Mr. Ellis was appointed assistant engineer, and in 1925, assistant engineer of motive power of the New York Central. On May 1, 1929, he was appointed eastern district manager and, subsequently, manager of the Railroad division of the Worthington Pump & Machinery Corp. On October 1, 1932, he resigned to become engineer of motive power of the Advisory Mechanical Committee of the Chesapeake & Ohio, Erie, New York, Chicago & St. Louis, and Pere Marquette, with headquarters at Cleveland, Ohio. In January, 1936, he was appointed mechanical assistant to the vice-president of the C. & O., N. Y. C. & St. L. and P. M., and in July, 1936, chief mechanical officer. On May 1, 1943, he became vice-president in charge of manufacture of the Lima Locomotive Works at Lima, Ohio. Upon the merger in the fall of 1947 of the Lima Locomotive Works and the General Machinery Corporation of Hamilton, Ohio, under the name of the Lima-Hamilton Corporation, Mr. Ellis continued as vice-president of the new corporation at Lima.

D. S. Ellis

W. A. Rentschler, executive vice-president, is a graduate of Princeton University. He started his career in 1925 with the Hooven, Owens, Rentschler Company. He became a vice-president of the General Machinery Corporation in 1929 and was elected president of the corporation in 1924. Upon the formation of the Lima-Hamilton Corporation in the fall of 1947, he became a vice-president of the new corporation. Mr. Rentschler has also been president of the Niles Tool Works Company, a division of Lima-Hamilton, since 1938. He is also a director of the Hamilton Foundry & Machine Co. of Hamilton, Ohio.

◆

PULLMAN-STANDARD CAR MANUFACTURING COMPANY.—*Col. Oscar C. Maier* has been appointed director of research for the Pullman-Standard Car Manufacturing Company, Chicago.

Colonel Maier, who recently resigned from the engineering division of the United States Army Air Forces at Wright Field, Ohio, is a graduate of the United

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★ ★ ★

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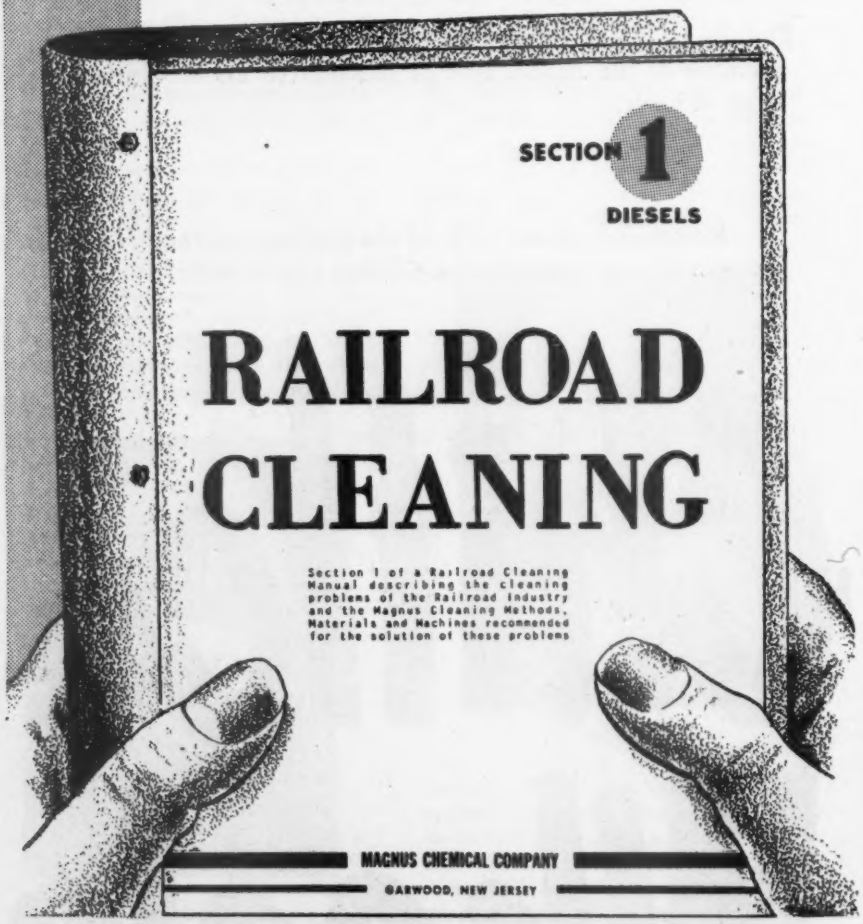
SECTION 1
DIESELS
RAILROAD CLEANING
Section 1 of a Railroad Cleaning Manual describing the cleaning problems of the Railroad Industry and the Magnus Cleaning Methods, Materials and Machines recommended for the solution of these problems
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Railroad Division

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Representatives in all principal cities

States Military Academy at West Point, N. Y. He also holds master's degrees from Yale University and the California Institute of Technology. During World War II and the postwar years, he served in various capacities in the signal corps and in engineering capacities with the Army Air Forces.

◆

SUPERIOR HAND BRAKE COMPANY.—The Superior Hand Brake Company, Chicago, has moved its offices from the Railway Exchange building, 80 East Jackson boulevard, to the Peoples Gas building, 122 South Michigan avenue.

◆

NATIONAL MALLEABLE & STEEL CASTINGS CO.—*John R. Kingman,* assistant manager of sales, railway division, of the National Malleable & Steel Castings Co., has been appointed sales manager of the division, at Richmond, Va., succeeding *William Blackmore,* who has retired after 43 years of service.

Mr. Kingman is a graduate of Columbia University and has taken graduate work at the University of Chicago and

John R. Kingman

Northwestern University. He enlisted in the army as a private in 1940 and had attained the rank of captain of infantry upon his release in March, 1946. He joined the engineering department of National Malleable at Cleveland, Ohio, in December, 1946, and was subsequently transferred to the St. Louis office as a field engineer. In 1947 he was appointed assistant manager of sales at Richmond.

Mr. Blackmore had served with National Company since 1906 in different capacities. In 1945 he became sales manager, Railway Division, with offices in Richmond.

◆

GENERAL MOTORS DIESEL, LTD.—The General Motors Corporation has begun construction of a Diesel-electric locomotive plant at London, Ont., to have a capacity of one locomotive a day, C. E. Wilson, G. M. C. president, has announced. The plant is to be erected on a 210-acre tract of land, contain 226,000 sq. ft. of floor space and employ approximately 1,000 persons. It will draw parts and materials from many Canadian sources, Mr. Wilson stated. The plant

with an EYE to maintenance

Simplicity and accessibility are two cardinal virtues of any mechanical device. Combined they make possible ease of maintenance with reliability following naturally. With this as our golden rule, many refinements suggested by experienced operating engineers and others conceived by ourselves have been incorporated in this new switcher. The novel arrangement of electrical controls and auxiliary equipment, providing easy and ample access for inspection and adjustment, is a fair example. Water-cooling of the engine exhaust manifold to equalize thermal expansion in related connections, thereby eliminating causes of serious exhaust gas leaks, is another.

The major consideration in ease of maintenance is a comfortable margin of ready power in the prime mover at all conditions of operation. The diesel engine in this switcher is a powerful rugged four-cycle supercharged type with 8-cylinder in-line configuration. All parts of it are precision machined requiring no hand fitting. Since the engine is supercharged, pistons are made smaller. With lighter reciprocating weights, the engine responds more rapidly to throttle changes. This procedure conforms strictly to modern trends in diesel-engine design.

Accessibility has been emphasized in the diesel-engine construction. For example, all gears in the timing train can be removed easily without disturbing the electric generator. Any piston can be pulled without removing its respective cylinder liner.

Arrange to have your people who know railroad diesels take a careful look at this switcher. It is powered by our own Hamilton-built engine which provides a full 1000 horsepower to the traction motors. Standard Westinghouse electrical equipment is used. Accessories are standard and of highest grade.

LIMA HAMILTON CORPORATION

DIVISIONS: *Lima, Ohio*—Lima Locomotive Works Division; Lima Shovel and Crane Division. *Hamilton, Ohio*—Hooven, Owens, Rentschler Co.; Niles Tool Works Co. *Middletown, Ohio* — The United Welding Co.

PRINCIPAL PRODUCTS: Locomotives; Cranes and shovels; Niles heavy machine tools; Hamilton diesel and steam engines; Hamilton heavy metal stamping presses; Hamilton-Kruse automatic can-making machinery; Special heavy machinery; Heavy iron castings; Weldments.

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● Even when you feel like a Tarzan you appreciate the sensible balanced loop handles that make the 4P easy to pick up, carry and work with. Mistake-proof workholder sets to size *before* you put it on pipe, one screw to tighten, no bushings. 4 sets of 5 high-speed steel chaser dies give clean accurate threads on 2½," 3," 3½" and 4" pipe. Ratchet handle furnished—RIDGID Universal Drive Shaft and Power Drive available for power-threading. For perfect threads easily, order the RIDGID 4P from your Supply House.

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operation and distribution of locomotives produced in Canada will be by a new subsidiary of General Motors to be known as General Motors Diesel, Ltd., which will work in close cooperation with the Electro-Motive Division at La Grange, Ill. The plant will build locomotives for all classes of railroad service.

◆

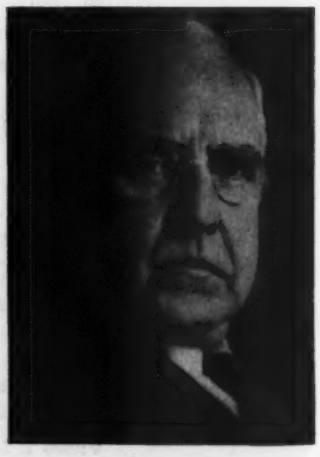
UNION RAILWAY EQUIPMENT COMPANY.—The Union Railway Equipment Company, Chicago, has appointed *Walter M. Gibbs*, of the W. M. Gibbs Railway Supply Company, 332 South Michigan avenue, Chicago, as its exclusive sales representative for "Ureco" devices in the Chicago territory and west to Salt Lake City, Utah; south through Texas, and east through Indiana.

◆

COLORADO FUEL & IRON CORPORATION.—As part of its $15,876,000 modernization and expansion program, the Colorado Fuel & Iron Corporation is now constructing a 27-stand continuous rod mill at its Pueblo (Colo.) plant, at a cost of $5,200,000. The mill is scheduled to begin operation prior to October 1.

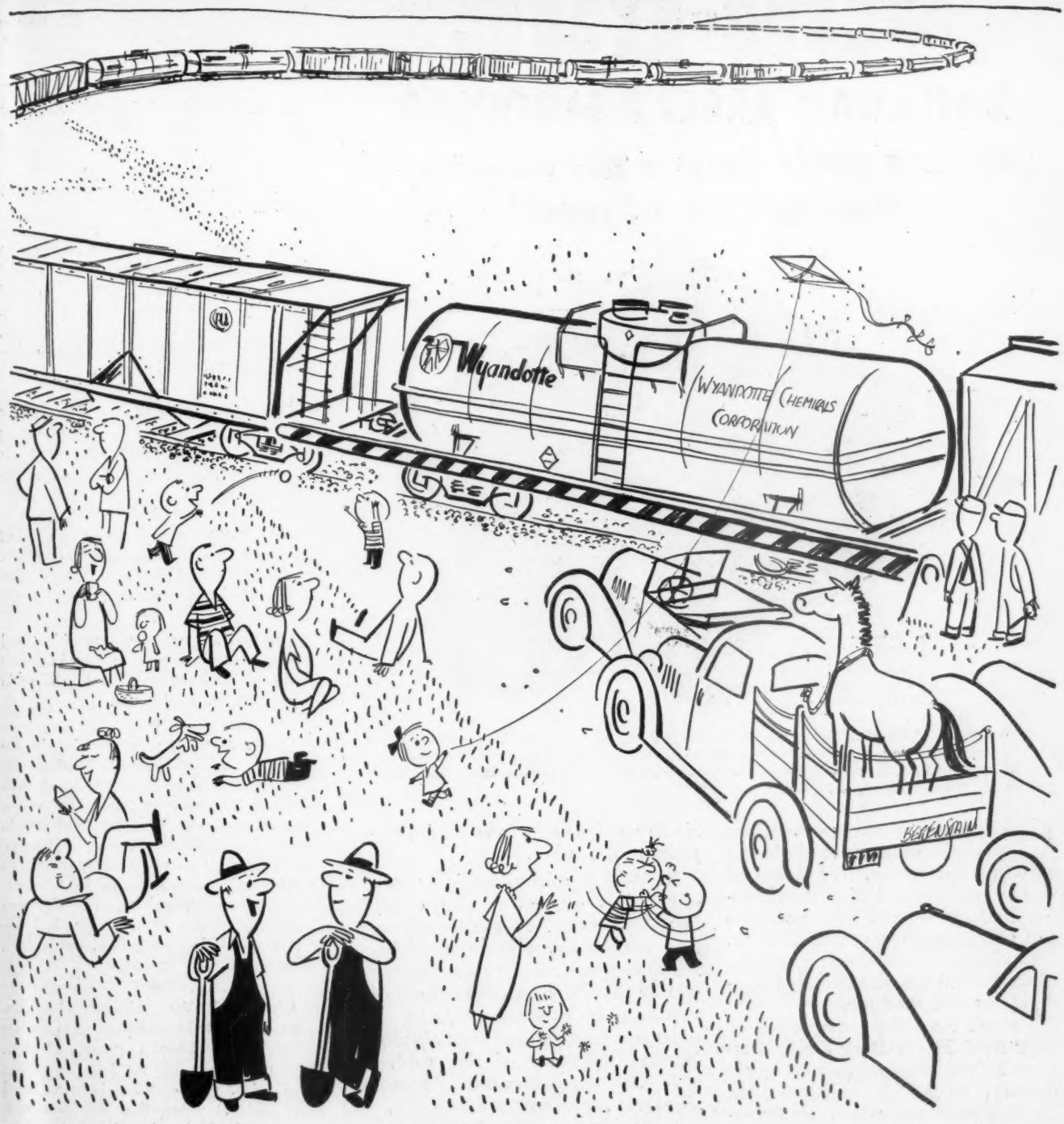
◆

OXWELD RAILROAD SERVICE COMPANY.—*Frank C. Hasse*, whose retirement as vice-president, mechanical department, of the Oxweld Railroad Service Company, a unit of Union Carbide & Carbon Corp., at Chicago, was reported in the August issue, entered railroad service in 1904 with the Atchison, Topeka & Santa Fe. He also served, successively, as fireman with the Chicago, Burlington & Quincy, and as enginehouse foreman and general boiler foreman with the Illinois Central prior to joining Oxweld in 1913 as an instructor. In 1916 he was assigned to the Chicago main office, leaving that post



Frank C. Hasse

early in World War I to enter the United States Army as a captain. He later held the positions of superintendent of construction at Camp Normyle, San Antonio, Tex., and commanding officer of that camp. Shortly after his return to Oxweld in 1919, Mr. Hasse was appointed superintendent of construction and maintenance. In 1927 he became general manager, and, later, vice-president.



"They've been waitin' here for seven hours"

You'll never have to wait this long for a moving train at a railroad crossing, but that's what *would* happen if the annual production of Wyandotte Chemicals Corporation were put into a single freight train. It would take more than 29,000 tank, box, dry ice and hopper cars to carry the 1,250,000-ton load. Moving at 30 m.p.h., the 222-mile-long train would pass a given spot in about seven hours.

Wyandotte Chemicals Corporation, with its own sources of raw materials, is the world's largest manufacturer of specialized cleaning compounds for business and industry. Wyandotte makes the *complete* line of railway cleaners.

No matter what your cleaning needs may be, you'll find there's a Wyandotte Product made to do the job efficiently, economically.

For details, write or call your nearest Wyandotte representative.

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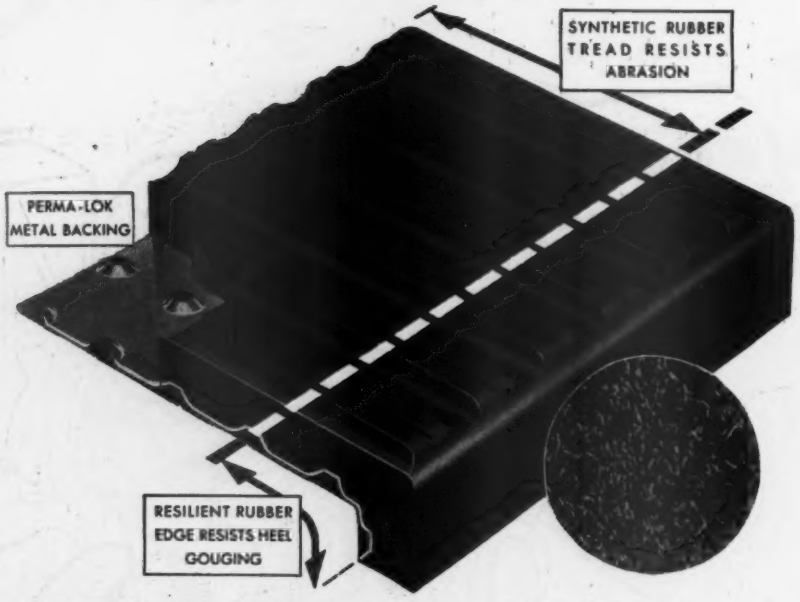
RUB-BUB*

RAILROAD SAFETY FLOORING

Outlasts steel! Reduces pay accidents!
Used by 7 Class 1 roads!



TWO-ZONE CONSTRUCTION is an exclusive feature of Rub-Bub Heavy-Duty Safety Step Plate. It increases flooring life, adds an extra margin of safety. Microphotograph shows dense, fibrous texture of Rub-Bub compound that's never slippery *wet or dry.*

CAR analyses show that step plates require special design to withstand two distinct types of wear. First, lip and edge should resist rolling weight of passengers and sharp, gouging action of heels. Second, step tread should resist the combined abrasive action of cinders, dirt and shoe soles.

Unique two-zone construction of RUB-BUB Heavy-Duty Safety Step Plate solves both problems. For resiliency, RUB-BUB compound in lip and edge contains a high percentage of *live* rubber. For extra abrasion resistance, the tread is a full 5/16 inch thickness of RUB-BUB *synthetic* rubber compound. Both compounds are molded into one integral plate, double-bonded mechanically and chemically to the Perma-Lok metal backing. *The possibility of broken step edges is completely eliminated.*

RUB-BUB step plate is as safe after years of service as the day installed. Exclusive Dri-Foot rib design and toothy texture of RUB-BUB compound are never slippery *wet or dry.* Wide grooves through step nose drain water off *faster* . . . squeegee ribs grip shoe soles *tighter.* Natural resiliency of live rubber edge *helps to prevent shattered shinbone accidents.*

Specify RUB-BUB Heavy-Duty Safety Step Plate in combination with RUB-BUB vestibule plate, aisle tread and underseat flooring for safety . . . long life . . . appearance. Write today for RUB-BUB samples—*the big value in railroad flooring.*

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*T. M. REG. U. S. PAT. OFF. A-2055

535 (Adv. 114)

G. H. HOUSTON, industrial consultant and president of the Baldwin Locomotive Works from 1929 to 1938, was killed recently in an automobile accident in Teziutlen, Mexico. Mr. Houston was 66 years old.

◆

H. B. ELLIS, former service manager of the Electro-Motive Division of General Motors Corporation, LaGrange, Ill., died at his home in Miami, Fla., on July 9. At the time of his retirement in 1948, Mr. Ellis was serving as assistant to vice-president of General Motors.

◆

FRANKLIN L. WHITCOMB, who retired in 1937 as president of the Griffin Wheel Company, Chicago, died on July 26 at his summer home in Cotuit, Mass., at the age of 87.

◆

W. J. LYNCH, retired vice-president and director of the American Steel Foundries, died on August 4 in the Lawrence Hospital, Bronxville, N. Y.

◆

EDWARD J. BURNELL, vice-president and general sales manager of the Link-Belt Company, Chicago, died at his home in Winnetka, Ill., on July 22.

◆

O. W. SWARTZ, representative in the Houston, Tex., office of the Westinghouse Air Brake Company, died on July 8 while on a business trip. Mr. Swartz became associated with Westinghouse in 1919 upon graduation from the Pennsylvania State College where he studied mechanical engineering. In 1923 he was appointed mechanical expert in the company's St. Louis, Mo., plant; in 1930, representative in Dallas, Tex., and in 1937, representative in Houston.

◆

FREDRICK K. VIAL, who retired in January, 1948, as vice-president and director of the Griffin Wheel Company, Chicago, died at Urbana, Ill., on July 27, at age of 85. Mr. Vial, who was born on April 22, 1864, at Lyonsville, Ill., was educated at the University of Illinois, where he received a degree in agriculture and natural history in 1886 and a master's degree in civil engineering in 1918. In 1887, he was employed as a rodman by the Atchison, Topeka & Santa Fe. He was division engineer of the Chicago & Alton (now part of the Gulf, Mobile & Ohio) from 1889 to 1892, and chief engineer of the Ajax Forge Company, at Chicago during 1895 and 1896. In the following year, Mr. Vial became principal assistant engineer of the Chicago & Western Indiana, and in 1902 mechanical engineer of the Griffin Wheel Company. In 1906 he was appointed chief engineer, in charge of manufacturing operations, cupola mixtures, wheel design, plant construction and research work. In addition, he was given other responsibilities affecting all plants of the company. Later Mr. Vial was elected vice-president, and in

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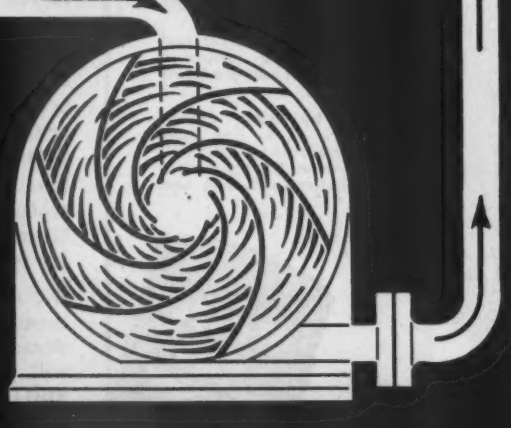
ELESCO CONTROLLED RE-CIRCULATION
STEAM GENERATOR

Controlled Re-circulation insures longer life . . . and full capacity for sustained periods



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Rolling Stock, Bridges, Tanks, Towers Metal Buildings, Signal Equipment and Other Properties Against COSTLY RUST!

Nothing equals Rust-Oleum —*the proved rust preventive* —for the lasting protection of metal—especially in closed or inaccessible areas where condensation due to temperature changes breeds rust.

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Stops Rust!

- Rust-Oleum cuts preparation time. No sandblasting or chemical cleaners are necessary.
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- Easy to use — Rust-Oleum assures lasting protection that resists rust-producing conditions.
- Apply by brush, dip or spray . . . in less time. Also available in small container sizes for economical distribution and field use.

Day and night—twenty-four hours a day—rust attacks railroad properties. Stop its deadly ravages by providing Rust-Oleum protection. Rust-Oleum coats metal with a tough, pliable moistureproof film that lasts years longer. *It's the proved answer to many rust problems.*

Rust-Oleum can be applied effectively and economically on all metal surfaces now in service—even where rust has already started. Merely wire-brush to remove scale and loose rust. Rust-Oleum merges the remaining rust into a rust-resisting, durable coating that defies time and the elements.

Save time and labor. Avoid frequent and costly replacements. Protect your properties with Rust-Oleum. Specify Rust-Oleum on new equipment, for re-building jobs . . . and for maintenance.

Get the facts now! Write for catalog containing complete information and recommended applications. Tell us your specific rust problems and we will gladly send you definite suggestions for Rust-Oleum applications.

RUST-OLEUM Corporation

2419 Oakton Street Evanston, Illinois

1917 was elected also a director. Upon the formation of the Association of Manufacturers of Chilled Car Wheels in 1908, he was appointed consulting engineer and subsequently became also vice-president, which position he also held at the time of his retirement.

◆

ORRIN H. BAKER, sales manager of the railroad materials and commercial forgings division, Carnegie-Illinois Steel Corporation (subsidiary of the United States Steel Corporation), with headquarters at Pittsburgh, Pa., died of a heart ailment on July 13, at his summer home in Burlington, Ont. Mr. Baker, who was 64, was a native of Hamilton, Ont., and a graduate in mechanical engineering of the University of Illinois. He began his industrial career as a laboratory chemist in the South Chicago plant of the Illinois Steel Company (now Carnegie-Illinois Steel Corporation) and in 1910 became a general steel salesman in the Chicago district, being transferred to the railroad sales division in 1921. After serving as assistant general manager of sales at Chicago from 1926 to 1933, he was promoted to general manager of sales. Two years later he was appointed western area railroad sales manager, with headquarters at Chicago. He became sales manager of the railroad materials and commercial forgings division in 1941. During World War II Mr. Baker served as an advisor on the War Production Board at Washington, D. C.

PERSONAL MENTION

General

C. J. NELSON, superintendent, Chicago Car Interchange Bureau, has retired.

W. F. KASCAL, superintendent of motive power of the Colorado & Southern (part of the Burlington Lines) at Denver, Colo., has been appointed mechanical superintendent of the Texas & Pacific at

W. F. Kascal

The New General Motors F7

hauls up to

33% more tonnage

– and does it with
no increase in
traction-motor
temperature rise
and with substantial
increase in motor life.

Reason? New Electro-Motive developed
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–inorganic insulation
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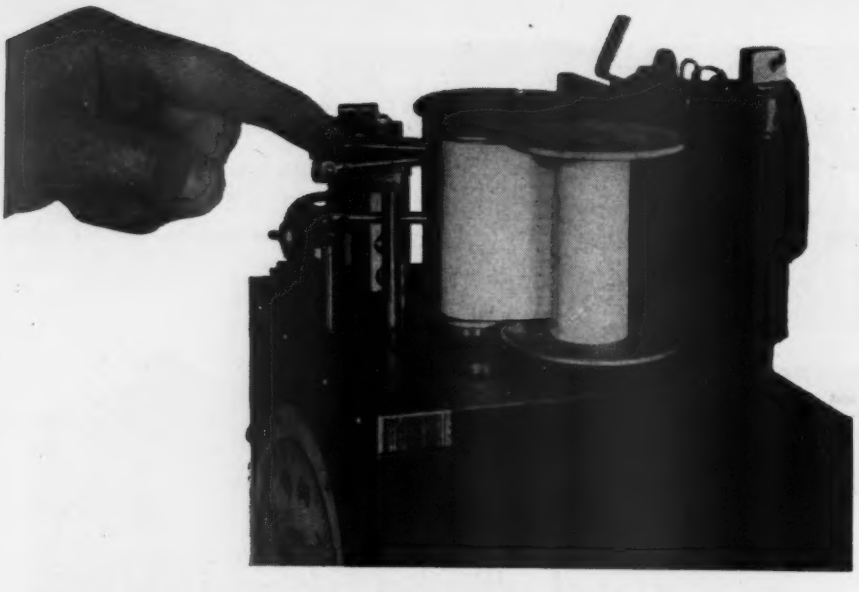


Here's the Score!

Valve Pilot "DIESELOMETER"

TRADE MARK

PRODUCTS

Diesel SPEED Recorder

The Valve Pilot SPEED Recorder for Diesels is included as part of the complete *Diesel Locomotive Operation Recorder* but is available as a separate unit where a record of speed only is desired. Valve Pilot Diesel SPEED Recorders have recorded speed accurately and dependably over hundreds of thousands of miles. Produced with typical Valve Pilot precision and durability for all types of Diesel road power.

In addition to speed, the Valve Pilot Diesel Operation Recorder permanently charts operating data on throttle, reverse, and transition levers, dynamic braking, etc., in any combination of recordings. An invaluable aid to management and enginemen alike.

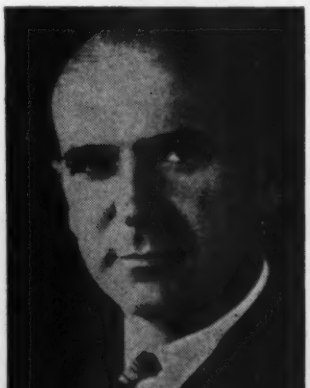
VALVE PILOT CORPORATION

230 Park Avenue, New York 17, N. Y.

Dallas, Tex. Mr. Kascal entered railroad service in 1916 as a machinist apprentice on the Chicago & North Western. Four years later he became an employee of the Chicago, Burlington & Quincy at Brookfield, Mo., serving as enginehouse foreman and general foreman at Red Cloud, Neb., Hastings, Alliance, Omaha, Lincoln and Casper, Wyo., from 1927 to 1943. While located at Omaha and Lincoln he supervised maintenance of motive power of the "Pioneer Zephyr," the first Diesel-powered passenger train in regular service on a railroad in the United States. Mr. Kascal subsequently became master mechanic of the C. & S. at Denver, and superintendent of motive power there in June, 1947.

ERNEST K. BLOSS, mechanical engineer of the Boston & Maine at Billerica, Mass., has been appointed mechanical superintendent of the B. & M. and the Maine Central. Mr. Bloss, who was born at Worcester, Mass., on April 16, 1896, is a graduate of Worcester Polytechnic Institute where he received the degree of B.S. in 1918 and a degree in electrical engineering in 1921. From 1918 to 1919 he was assistant power and electrical engineer, Remington Arms, and from 1920 to 1925 as railway engineer for the Westinghouse Electric & Manufacturing Co. He entered the service of the Boston & Maine in 1926 as assistant electrical engineer. He became supervisor rail motor cars in 1929; supervisor Diesel maintenance and operation of the B. & M. and M. C. in 1944, and mechanical engineer in September, 1947.

WILLIAM L. LENTZ, vice-president of the American Locomotive Company at New York, has been appointed superintendent of equipment of the Delaware & Hudson, with headquarters at Albany,



William L. Lentz

N. Y. Mr. Lentz succeeds to the duties of superintendent of car equipment and superintendent of motive power, respectively which positions have been abolished. Mr. Lentz was born at Jersey Shore, Pa., on January 29, 1895, and began his railroad career in 1913 by taking a special apprentice course in the locomotive shops of the New York Central. Following World War I service as

Railroad performance results PROVE that

DY-NAMIC BALANCING

- **LOWERS COSTS**
- **IMPROVES THE RIDE**

CUTS DIESEL COSTS *by Reducing Wear on Bearings, Brushes, Armatures and Crankshafts.*

INCREASES LIFE *of Car Wheels and Track.*

Just Off the Press! Every Railroad Man is invited to send for a COMPLIMENTARY COPY of this REPORT

Here are the first-hand facts on one of the hottest topics of discussion among railroad men today: "Does Dy-Namic Balancing of armatures, wheels, etc. improve railroad performance and reduce maintenance costs?"

When you read statements by railroad men — diesel shop superintendents, maintenance foremen, chief engineers — you find out *just how much* performance can be improved, *just how much* maintenance costs can be cut with "BEAR" Dy-Namic Balancing.

This report is based entirely upon railroad experience with the Dy-Namic Balancing of armatures, wheels and other rotating parts on "BEAR" Dy-Namic Balancing Machines. It comes from such experiences as the complete balancing of rotating parts on the Pullman Co. cars, the balancing of wheels on the I.C. "Daylight Special" and General Motors' "Train of Tomorrow", and Dy-Namic Balancing tests conducted by the A.A.R., Budd Co. and Timken Roller Bearing Co.

"BEAR" DY-NAMIC BALANCING MACHINES make Dy-Namic Balancing **PRACTICAL** and **PROFITABLE** for Railroad Maintenance Operations!

- FAST—armatures can be balanced in as little as 20 minutes!
- ACCURATE and dependable!
- EASY TO OPERATE—any shop hand can learn to operate in a few hours!
- Requires MINIMUM CAPITAL INVESTMENT
- Balance DY-NAMICALLY and STATICALLY in ONE OPERATION!
- EASILY ADAPTED to any railroad maintenance operation!
- MINIMUM FLOOR SPACE required!

When you read the overwhelming evidence of performance improvements, maintenance-cost cuts and lay-up time savings as reported by railroads now using "BEAR" Dy-Namic Balancing Machines, it will become evident to you that Dy-Namic Balancing is one of the most important developments in 20th Century railroading.

Dy-Namic Balancing is especially significant because of the growing dieselization of railroads. Higher speeds and greater importance of efficient armature and generator operation in diesel engines, make Dy-Namic Balancing an essential to efficient diesel operation.

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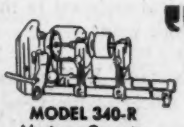
A FULL RANGE OF "BEAR" DY-NAMIC BALANCING MACHINES FOR ALL TYPES OF ROTATING RAILROAD EQUIPMENT!

Traction Armatures · Main Generator Armatures · Crankshafts · Fans · Wheels · Air Conditioning Equipment · Flywheels · Gears · and many more!

MODEL 337-V
Maximum Capacity
6 pounds



MODEL 340-R
Maximum Capacity
100 pounds

"BEAR"
Trade Mark Registered U. S. Patent Office
STATIC AND *DY-NAMIC BALANCING* MACHINES

MODEL 375-R
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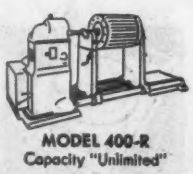
2000 pounds

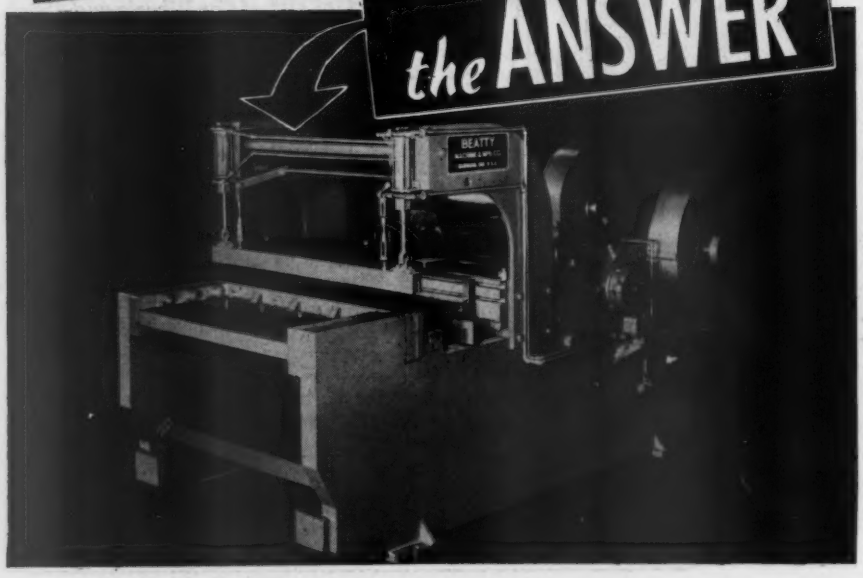


MODEL 400-R
Capacity "Unlimited"

the PROBLEM

Punching a long line of holes horizontally through a vertical flange after forming.

the ANSWER



NEW HORIZONTAL MULTIPLE PUNCH
SOLVES PUNCHING PROBLEM FOR RAILWAY SHOP

This new Horizontal Multiple Punch, one of the first of its type, is typical of how practical, but imaginative engineering can solve problems. Designed for a railway shop, the new machine punches a series of holes horizontally through a vertical flange, providing for faster, lower cost production, and a more accurate fabrication. An air clamp device holds the material down during the punching operation for gauging purposes. Stripping is accomplished by air cylinders which travel with the ram. If you have a production problem, let a Beatty engineer work with you on it.

Write for full details on the new Horizontal Multiple Punch.

BEATTY MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

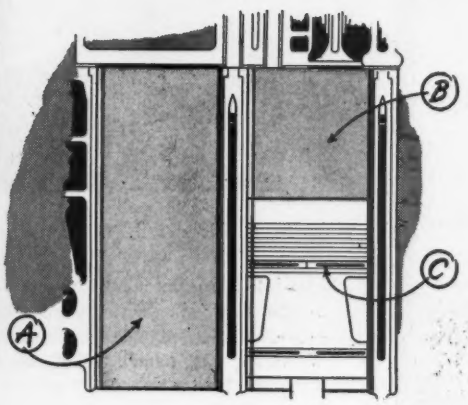
an army aviation corps lieutenant, Mr. Lentz rejoined the N. Y. C. and advanced to the position of engineer of motive power in the engineering department at New York. He became associated with the Standard Stoker Company in 1937 as assistant to the vice-president and sales manager. In 1940 he was appointed manager of the American Locomotive Company's Schenectady, N. Y., plant and, in 1945, vice-president in charge of manufacturing. He was a member of American Locomotive's administrative committee, and in January, 1948, assumed also the duties of senior vice-president.

DAVID C. REID, mechanical assistant to the general manager of the Boston & Maine and the Maine Central, with headquarters at Boston, Mass., retired on July 16, after 44 years of continuous railroad service. Mr. Reid was born at Chicago on April 7, 1890, and entered railroad service in June, 1905, as a call boy on the Chicago Terminal, becoming a machinist apprentice the following year. In 1910 he went with the Elgin, Joliet & Eastern and from 1911 to 1912 served with the Hubbard Steel Foundry and then with the Goldschmidt Detinning Co. From 1913 to February, 1927, he was employed on the Chicago, Indiana & Southern (now New York Central) and the Indiana Harbor Belt, successively, as machinist, machinist foreman, enginehouse foreman, general enginehouse foreman, and master mechanic. Mr. Reid became supervisor of locomotive maintenance of the B. & M. at Boston in February, 1927. Two years later he was appointed assistant chief mechanical officer, having supervision over all shops and enginehouses on the entire system. On July 1, 1932, he was appointed mechanical superintendent; in May, 1933, general superintendent of motive power of both the Boston & Maine and the Maine Central, and on November 15, 1948, mechanical assistant to the general manager of both roads.

David C. Reid

RICHARD J. WILLIAMS, chief mechanical officer of the Pere Marquette district of the Chesapeake & Ohio at Detroit, Mich., whose retirement was reported in

Case D119E—Reducing Wear on Liners in Diesels



DIESEL ENGINE LINERS AND PISTON

In high-speed Diesel engines lubricated with RPM DELO Diesel Engine Lubricating Oil, wear on liners was held to a minimum with little variation over their entire areas. A constant lubricating film was maintained on them even in high-temperature belts. RPM DELO Oils are recommended for all types of Diesels. Come in all viscosity grades necessary for your engines.

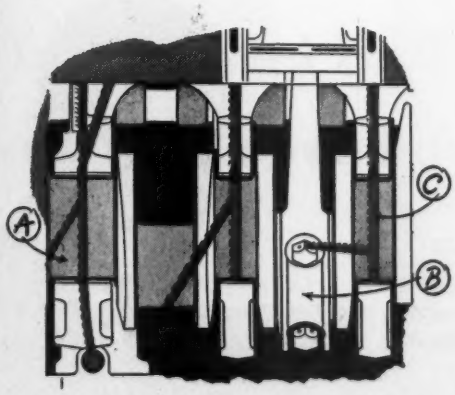
A. Special additive provides metal-adhesion qualities...keeps oil on all parts whether hot or cold, running or idle.

B. An anti-oxident resists formation of lacquer—resistance to extreme heat provides lubrication in the toughest conditions.

C. Contains detergent which keeps rings clean and operating freely...prevents scratching and gouging of liners.

RPM DELO Diesel Oil will not corrode any bearing.

Case D119F—Prolonging The Lives of Diesel Bearings



SECTION OF DIESEL ENGINE CRANK AND CAM

No bearing failures occurred between overhaul periods in Diesel engines used in the toughest service when they were lubricated with RPM DELO Diesel Engine Lubricating Oil.

A. Non-corrosive to all types of bearing metal...inherent ability of base stocks and added compound resist oxidation and formation of acid which is common cause of bearing corrosion.

B. Maintains a tough lubricating film which withstands excessive shocks and pressures.

C. Special detergent compound keeps oil passages clean and open - allows free flow of lubricant to vital points.

Another compound in RPM DELO Oil prevents foaming of the oil. An accurate measurement of crankcase levels can always be obtained.

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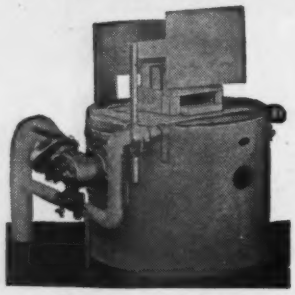
JOHNSTON

OIL BURNING

BLACKSMITH FORGES



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EQUIPPED with JOHNSTON REVERSE BLAST Low Pressure Burners—great atomizing power, full air pressure on atomizer at all times, oil and air thoroughly mixed. Start with full fire instantly without smoke. Fire adjusted quickly. Eliminate handling of coal and ashes. Shields and curtain pipe protect operator from heat. All steel construction. We'll help you convert coal burning forges to oil.

JOHNSTON LOW PRESSURE BLOWERS can be furnished to supply the air to burner and air curtain pipe for one or more of these forges.

Write for Bulletin R-301

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ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT

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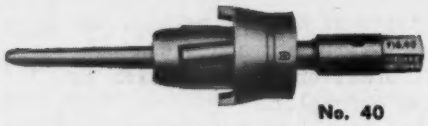
TUBE EXPANDERS NATIONALLY KNOWN FOR DEPENDABLE . . . ECONOMICAL *Service*



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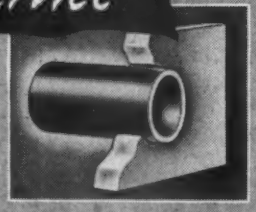

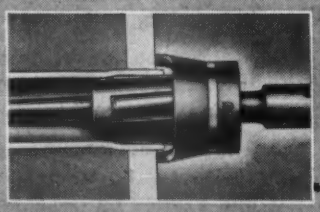

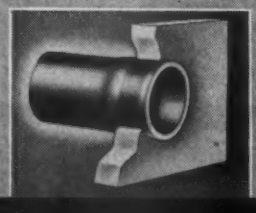

IDEAL ACE TUBE EXPANDERS

The boilermakers' selection for more than a half century, for LOCOMOTIVE and general boiler work . . . guard straddles tube and bears against tube sheet, suitable for rolling new tubes and re-rolling tubes with flared or beaded ends.

MINIMUM FRICTION . . . absorbed by bronze bearing between guard and frame, resulting in much easier and faster operation.

Long rolls have generous radius on end and will not create sharp offset within the tube.

See your dealer or write today for general catalog on Wiedeke Tube Expanders and Tube Cutters.

The Gustav **Wiedeke** *Company*
DAYTON 1, OHIO

the August issue, was born at Indianapolis, Ind., in 1882. He is a graduate of Purdue University (1905). He entered railroad service in 1899 as a helper on the Peoria & Eastern (now part of the New York Central) and, following his graduation from college, became a special apprentice, subsequently serving as foreman and shop superintendent. In 1917 he was

Richard J. Williams

appointed superintendent of motive power of the Pere Marquette, which was subsequently merged with the C. & O. Mr. Williams was named chief mechanical officer in 1943.

A. V. NYSTROM, whose appointment as assistant to the general superintendent of motive power of the Chicago, Rock Island & Pacific at Chicago, was reported in the August issue, was born at Montreal, Que., on January 22, 1916, and is a graduate in mechanical engineering of Marquette University (1940). He entered railroad

A. V. Nystrom

service with the Chicago, Milwaukee, St. Paul & Pacific in June, 1934, as a machine-shop helper at Milwaukee, where he served from 1936 to 1943, successively, as special apprentice, schedule inspector and freight car foreman at that point. He was subsequentiy appointed car foreman at Aberdeen, S. D., and in December, 1943, became general car foreman at Kansas City, Mo. After serving as assistant to superintendent, car department, at

STRIPPING TWO CAR WHEELS SIMULTANEOUSLY AT N.Y.O. & W.R.R. SHOPS, MIDDLETOWN, N. Y.

All standard MCB car axles and wheels, together with trailer sets and diesel locomotive wheels, can be stripped in the Chambersburg Duplex Wheel Press with a speed unequalled by any other method.

STRIPPING DIESEL WHEELS AND GEAR SIMULTANEOUSLY

Details in Bulletin 18-L-8

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ULTRASONIC REFLECTOSCOPE

Locates Hidden Defects in Locomotive Parts

Testing locomotive axle with the Sperry SR05 Ultrasonic Reflectoscope in the Collinwood, Ohio shops of the New York Central Railroad.

Reduces Maintenance Costs Adds Mileage, Increases Safety

By directing ultrasonic waves into the heart of locomotive axles and crankpins without removing driving wheels from axles or removing pins from driving wheel centers, the Sperry Ultrasonic Reflectoscope makes possible frequent economical inspection for fatigue cracks. No costly "knock-downs" are necessary. Tests can be made at tire turning, during periodic inspection, or any other time.

By bringing non-destructive testing right to the job, the Sperry Reflectoscope cuts maintenance costs. It eliminates axle damage resulting from wheel removal.....thus adds extra mileage. And since the Reflectoscope can be used as frequently as desired, it increases safety.

The portable **MODEL SR05 REFLECTOSCOPE** *is so compact that one man does the entire job of handling, setting up, and testing.*

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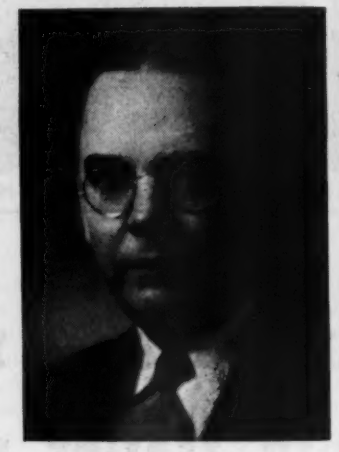
Milwaukee, he was transferred to Chicago in November, 1945, as district general car foreman. He returned to Milwaukee two years later as assistant superintendent, locomotive and car departments, and became assistant to superintendent car department, of the Milwaukee in January, 1949.

DONALD MCKEOWN, assistant mechanical engineer of the Boston & Maine, has been appointed mechanical engineer of the B. & M. and the Maine Central, with headquarters as before at Billerica, Mass.

ELMER A. KUHN, superintendent of motive power, Pere Marquette district, of the Chesapeake & Ohio at Grand Rapids, Mich., who has been given also full jurisdiction over the mechanical department, as reported in the August issue, was born on May 2, 1897, at East Radford, Va. He is a graduate of the University of Pittsburgh (1920). He entered railroad service in June, 1913, with the Toronto, Hamilton & Buffalo, and became a machinist in the employ of the New York, Chicago & St. Louis in June, 1920. He later held the positions of enginehouse foreman, special engineer and engineer motive power. In 1929 he was appointed assistant engineer motive power, advisory mechanical committee, of the C. & O., the Nickel Plate and the Pere Marquette (now C. & O.); in 1932 master mechanic of the P. M. at St. Thomas, Ont., in 1937 master mechanic at Saginaw, Mich., and in February, 1947, superintendent of motive power at Grand Rapids.



Elmer A. Kuhn

CLYDE B. HITCH, chief mechanical officer of the Chesapeake district of the Chesapeake & Ohio at Richmond, Va., whose retirement was reported in the August issue, was born at Terre Haute, Ind., on November 19, 1881. He entered railroad service in 1896 as a machinist with the Vandalia (now part of the Pennsylvania) at Terre Haute, completing his apprenticeship in 1900. He later served as machinist on the Pere Marquette, Louisville & Nashville, Iron Mountain (now Missouri Pacific), Southern, and Chicago & Eastern Illinois. He entered

Already "Standard" on 30 Class I Roads

Within 8 months after it was introduced last fall, *the ALCOLID* was adopted as standard by 30 Class I roads and many short-line roads.* Thousands of ALCOLIDS are now in service, some installed on new rolling stock and others as replacements for less satisfactory lids.

And no wonder! The ALCOLID is good for a lifetime when given only routine care. It is easy to see what this means to railroad mechanical men who are charged with keeping rolling stock in revenue service while cutting costs at the same time. No other box lid has all these features:

LIFETIME DESIGN—no hood to come off, no eyes to break off, no pin-hole elongation, no binding on the lug cam of the journal box. Designed for a lifetime of service.

LOCKED AGAINST VIBRATION—A torsional spring exerting a full 50 pounds' pressure keeps the ALCOLID shut tight at all times. The square-headed retaining pin is held securely in place by a flanged hood ear bent over the pin head as an anvil. Locked against vibration, *the pin cannot rotate,* so wear on the eyes of the hood and the box lug is eliminated.

NO BINDING—The roller mounted on the spring forms a roller bearing which prevents wear on the lug cam of the journal box. The ALCOLID is as easy to open the thousandth time as it was when first installed.

ONLY TWO PARTS—the lid itself and a retaining pin. The simplest, most dependable lid ever constructed. Of sturdy, full-section steel construction, the ALCOLID has no thin parts to rust away.

APPLICATION—for proper and effective operation, the shipping pin must be withdrawn and discarded after retaining pin is inserted. Instructions for application accompany each shipment.

TIGHT SEATING ASSURED—The ALCOLID's fully-articulated construction assures tight seating on box face regardless of normal misalignment of pin holes—a feature which permits it to replace any type of traditional lid.

ALCOLID*

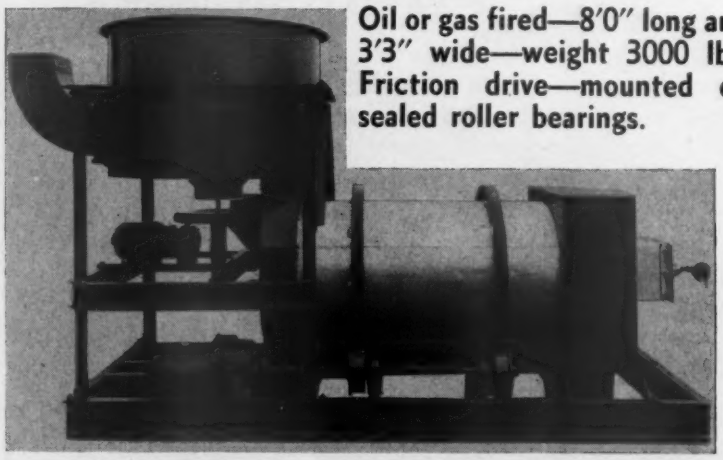
Railway Steel Spring Division • American Locomotive Company

30 Church Street, New York 7, N. Y.

*AAR Type Designation S62. Trademark registration applied for.

Viloco ROTARY SAND DRYER

The efficient method of drying sand — producing more than 2 tons of dry sand per hour at low fuel cost.



Oil or gas fired—8'0" long and 3'3" wide—weight 3000 lbs. Friction drive—mounted on sealed roller bearings.

The VILOCO Rotary Sand Dryer obtains maximum thermal efficiency. Wet sand from preheated hopper passes to revolving disc feeder thence by gravity into rotating cylinder. A curtain of sand is constantly exposed to the hot gases removing all moisture. Dry sand is screened as it passes from cylinder to outlet. Oversize material passes out of a separate discharge.

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CONVENTION BOOTHS 153 AND 154

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ENGINEERS · DESIGNERS · MANUFACTURERS
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SLOT TYPE FORGE . . To Speed Production of FORGED GRAB IRONS

200 IRONS — 1400 PINS PER DAY IN THIS C & O SHOP!

Depend on a Mahr slot type forge to speed your heating and hurdle your toughest forging jobs. Heat slugs, plates and other steel shapes fast, with temperatures up to 2400° F.—Gas or oil fired. Designed with adjustable refractory lined shield—air curtain and chain type safety curtain for more protection and higher production from the operators.

Mahr slot type forges are available in single or double front openings. Specially designed furnaces for your requirements on request.

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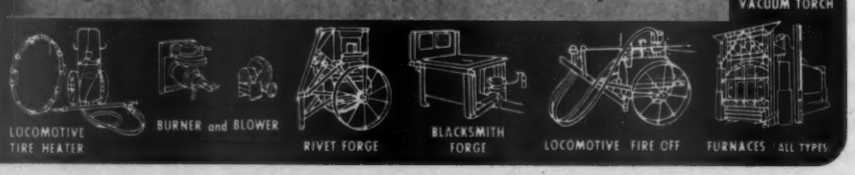
DIVISION OF DIAMOND IRON WORKS, INC.
MINNEAPOLIS, MINNESOTA, U. S. A.

VACUUM TORCH



LOCOMOTIVE TIRE HEATER · BURNER and BLOWER · RIVET FORGE · BLACKSMITH FORGE · LOCOMOTIVE FIRE OFF · FURNACES ALL TYPES

the service of the C. & O. as machinist at Lexington, Ky., in 1902 and subsequently served as general foreman, master mechanic and general master mechanic at various points. Mr. Hitch was appointed assistant superintendent motive power at Huntington, W. Va., in 1934; superintendent motive power at Richmond in 1938, and chief mechanical officer at Richmond on May 1, 1943.

HUGO M. MCINNIS, assistant to the chief mechanical officer, Chesapeake & Ohio, at Detroit, Mich., has been appointed assistant superintendent of motive power, Pere Marquette district, with headquarters at Grand Rapids, Mich. His former post has been abolished.

G. S. EDMONDS, superintendent of motive power of the Delaware & Hudson at Albany, N. Y., has retired. Mr. Edmonds, who was born on March 19, 1873, at Glen Cove, N. Y., is a graduate of Cornell University (1895). He entered railroad service in August, 1895, as an inspector in the machine shops of the New York Central & Hudson River (now New York Central). In 1897 he was transferred to the drafting room. In 1900 he became mechanical engineer of the D. & H. In October, 1905, he was appointed master mechanic, Susquehanna division at Oneonta, N. Y.; in August, 1912, superintendent of shops at Colonie, and in April, 1920, superintendent of motive power at Albany.

H. S. MERCER, shop superintendent, locomotive department, of the Seaboard Air Line at Jacksonville, Fla., has been promoted to assistant chief mechanical officer, with headquarters at Norfolk, Va.

C. A. MOODY, superintendent of shops of the Chicago, Burlington & Quincy and the Colorado & Southern (part of the Burlington Lines) at Denver, Colo., has also been appointed superintendent of motive power of the C. & S. at Denver.

NEW YORK CENTRAL-BOSTON & ALBANY.—The equipment department of the New York Central, lines East, and of the Boston & Albany, have been reorganized as follows: The master mechanic at Buffalo, N.Y., will have jurisdiction over both locomotive and car departments on the Buffalo, Rochester, Syracuse and St. Lawrence divisions. The master mechanic at Albany, N. Y., will have jurisdiction over both locomotive and car departments on the Mohawk, Adirondack and River divisions; locomotive department on the Hudson, Harlem and Putnam divisions; car department on the Hudson division East, to and including Poughkeepsie, N.Y.; car department at Chatham, N.Y., and both locomotive and car departments at Hudson, N. Y.

The positions of master mechanic at Harmon, N. Y., and East Syracuse (Dewitt) are abolished and changed to assistant master mechanics, reporting directly to master mechanics at Albany and Buffalo, respectively. The positions of division general car foremen at Albany

Take Quick, Accurate Inside Measurements

From 1/8 to 6 inches With These Two Lufkin Tools

● Skilled mechanics everywhere are finding the Lufkin Telescoping Gage and the Lufkin Small Hole Gage essential companion tools in the well-fitted efficient tool kit. They simplify the taking of difficult measurements, such as, measuring deep within the hub of a gear or small hole diameters where the use of an inside micrometer is impractical.

Notice these features which you will instantly recognize as important time and error savers.

THE LUFKIN
LESCOPING GAGE

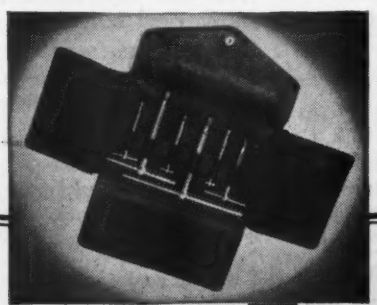
An exclusive design feature is the double telescoping action of the plungers. As a result, the handle is always centered giving perfect balance and "feel" so essential to accuracy.

LUFKIN Telescoping Gages and

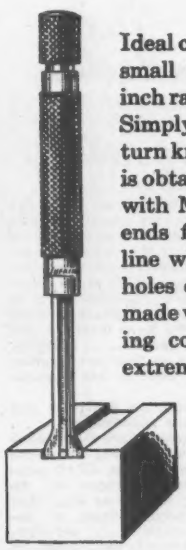
Measurements down to one thousandth inch or less are taken from the gage with a Micrometer.

Each gage has its own handle sized in direct proportion to its plunger range, assuring perfect balance found in no similar gage.

Available individually or in sets packed in a durable leatherette case. Range 5/16 to 6 inches.



New Small Hole Gages



Ideal companion tool for measuring small holes or slots below the 5/16 inch range of the Telescoping Gage. Simply insert ball end in hole—turn knurled knob until right "feel" is obtained—then measure ball end with Micrometer. Gages have ball ends flattened off close to center line which permits gaging shallow holes or grooves. Provision is also made whereby travel of the expanding cone is stopped at both the extreme open and closed limits of the gage preventing breakage. Available individually in four different sizes, or as a complete set with range of 1/8 to 1/2 inch.

Write Dept. RE for fascinating booklet, "The Amazing Story of Measurement." Enclose 10c (no stamps) to cover handling and mailing.

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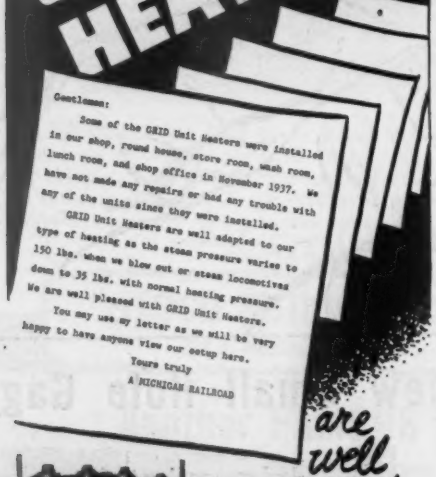
PRECISION TOOLS • TAPES • RULES

FROM YOUR DISTRIBUTOR

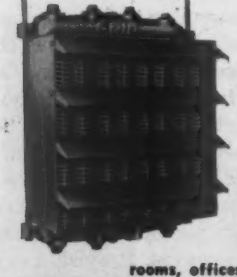
IT'S UNANIMOUS!

RAILROAD USERS SAY!

GRID UNIT HEATERS


Gentlemen:
Some of the GRID Unit Heaters were installed in our shop, round house, store room, wash room, lunch room, and shop office in November 1937. We have not made any repairs or had any trouble with any of the units since they were installed.
GRID Unit Heaters are well adapted to our type of heating as the steam pressure varies to 150 lbs. when we blow out or steam locomotives down to 35 lbs. with normal heating pressure.
We are well pleased with GRID Unit Heaters.
You may use my letter as we will be very happy to have anyone view our setup here.
Yours truly
A MICHIGAN RAILROAD

are well adapted to all types of heating



Railroads all over the country report the same service from GRID Unit Heaters, whether installed for round houses, shops, store rooms, wash rooms, offices, etc. (as illustrated by above reproductions of letters received from railroads who have installed and used GRID Unit Heaters . . . many of them for as long as fourteen heating seasons). These reports are possible because:

HIGH TEST CAST IRON HEATING SECTIONS

GRID Unit Heaters are designed and made to eliminate maintenance . . . GRID heating sections are ONE piece construction high test cast iron—the metal for permanency. In GRID condenser "fin" sections there are no soldered, brazed, welded or expanded connections to become loose or develop leaks, breakdowns . . . no electrolysis to cause corrosion, breakdowns, leaks or heating failures, because there are no dissimilar metals used in GRID construction . . . GRID IS MAINTENANCE-FREE.

SAVES FUEL COST TOO!

GRID Unit Heaters are designed to save fuel cost, because they provide heat where it is most needed —to the working zone. They eliminate stratification of warm air at ceiling level . . . GRID Unit Heaters are designed for low outlet temperatures and greater air delivery to the floor line—not the ceiling.
Investigate the GRID system of diesel house heating. It's new and proved for this different service!

Write today for the complete GRID story—CUH-849-RM, capacity tables and engineering data.

D. J. MURRAY MANUFACTURING CO.
WAUSAU · WISCONSIN

and Buffalo are abolished and changed to assistant master mechanics, also reporting to master mechanics at Albany and Buffalo, respectively.

Headquarters of the master mechanic on the Boston & Albany have been changed from Springfield, Mass., to Boston, Mass., with jurisdiction of this office extending over both locomotive and car departments, except at Hudson, which is now under jurisdiction of the master mechanic at Albany, as noted above. The position of division general car foreman of the B. & A. has been abolished.

The jurisdiction of the master mechanic at Avis, Pa., and the division general car foreman at New York (Mott Haven) will remain unchanged, except that the master mechanic at Albany has assumed supervision of the car department at Chatham, as noted above.

D. M. WOOD, Diesel superintendent, of the Seaboard Air Line has had his headquarters changed from Jacksonville, Fla., to Norfolk, Va., where he will report to the chief mechanical officer.

Diesel

GEORGE F. BACHMAN, master mechanic of the Delaware, Lackawanna & Western at Buffalo, N. Y., has been appointed superintendent of Diesel locomotive maintenance at Scranton, Pa.

PAUL F. GIESKING, who has been appointed superintendent Diesel equipment of the Denver & Rio Grande Western at Denver, Colo., as announced in the June issue, was born on May 13, 1911, at Denver. He completed high school in 1927 and on February 17, 1930, became a machinist apprentice in the employ of the D. & R. G. W. at Denver. He completed his apprenticeship on July 17, 1936, and until November 12, 1937, served as a machinist at Denver; at Grand Junction, Colo.; and with the Hessell Iron Works at Colorado Springs, Colo. He returned to the D. & R. G. W. as a machinist inspector at the Baldwin Locomotive Works on October 13, 1937. He became lubrication inspector for the D. & R. G. W. system on May 14, 1938; Diesel supervisor, system, on February 1, 1942; assistant master mechanic, Pueblo division, on September 1, 1943; master mechanic, Grand Junction division, on January 1, 1944, and superintendent Diesel equipment on April 1, 1949.

Master Mechanics And Road Foremen

P. R. COLYER, assistant road foreman of engines of the Chesapeake & Ohio at Stevens, Ky., has been promoted to the position of road foreman of engines, with headquarters at Stevens.

L. H. BOOTH, general enginehouse foreman of the Chesapeake & Ohio, has been appointed master mechanic of the Chicago division of the road, with headquarters at Peru, Ind.

JOHN W. ROWLEY, assistant master mechanic of the Toronto, Hamilton & Buffalo, has been appointed master mechanic, with headquarters as before at Hamilton, Ont. The position of assistant master mechanic has been abolished.

RAY B. COBEAN has been appointed road foreman of engines of the Southern, with headquarters at Danville, Va.

J. G. CARLTON, master mechanic of the Seaboard Air Line at Hamlet, N. C., has been appointed master mechanic of the North Florida division of the road, with headquarters at Jacksonville, Fla.

F. J. SMITH, enginehouse foreman of the Atlantic Coast Line at Waycross, Ga., has been appointed acting master mechanic, with headquarters at Waycross and jurisdiction over the Waycross and Ocala districts.

Car Department

GEORGE W. DITMORE, superintendent of car equipment of the Delaware & Hudson at Albany, N. Y., has retired. Mr. Ditmore was born at Jermyn, Pa., on February 17, 1878. He entered the service of the D. & H. on June 1, 1897, as a car inspector. From March, 1902, to December, 1913, he was, successively, interchange inspector at Scranton, Pa., and foreman car inspectors and repairers at Scranton, Pa., Buttonwood, and Wilkes-Barre. In December, 1913, he became shop foreman at Carbondale, Pa.; in 1917, division car foreman, Pennsylvania division; in November, 1918, assistant master car builder at Colonie, N. Y., and on January, 1919, master car builder. Mr. Ditmore was appointed superintendent of car equipment on March 1, 1944.

Shop and Enginehouse

J. C. SMITH, master mechanic of the Chesapeake & Ohio at Peru, Ind., has been appointed assistant shop superintendent, with headquarters at Huntington, W. Va.

J. L. SAVAGE, assistant shop superintendent at the Huntington, W. Va., shops, of the Chesapeake & Ohio, has been appointed shop superintendent of the Huntington shops.

V. H. DUNFORD, general master boilermaker of the Seaboard Air Line at Norfolk, Va., has retired after 51 years of active service.

L. B. ALEXANDER, assistant shop superintendent, locomotive department of the Seaboard Air Line at Jacksonville, Fla., has been appointed shop superintendent, locomotive department, at Jacksonville.

R. L. LYNN has been appointed assistant shop superintendent, locomotive department, of the Seaboard Air Line, with headquarters at Jacksonville, Fla.

H. W. HAYWARD, shop engineer of the Canadian Pacific at the Angus shops, Montreal, Que., has been appointed to the new position of engineer of standards and methods, with system-wide jurisdiction over standards and methods for main-